

Van Lam Hun

(Space Age)

R.K. Lallianth

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A CHHUNGA THU AWMTE

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THUHMAHRUAI

Vân sâng lama mihringte hmasâwnna chakzia hi ngun takin kan ngaihtuah ngai em aw? Kum 1957 October ni 4-ah Russia chuan thla lem hmasa ber a kâp chhuak a, kum 1961 April ni 12-ah vân sâng boruakah mihring an thawh thei a, kum 1969 July ni 20-ah America mi pahnih pheih chuan thla an thleng thei ta hial a. Nî hêltu (planet)-ah te boruak lawng thawh nin, planet dang chanchin kan hriat belh zêl a, arsi dang hêltu (exoplanet) pawh an hmu chhuak ta zêl mai. Vân sâng chawllhmun (space station) te dinin, vân khawhthei (space shuttle) vawi tam tak kah chhuah a ni tawh bawh. Vân sâng boruaka entlang (space telescope) hmangin vân lam chanchin pawh kan hre ril sâwt hle.

Kan awmna lei hêltu thla lem chi hrang hrangte chu mihringte tân kawng hrang hrangin an tangkaiin, heng thla lemte tel lo chuan tûnlai thangtharte hi kan nung thiam tawh hauh lovang le. Khawvêl pumpui ngaihtuah pawhin India ram hi a hmasâwn chak pâwl tak niin, keini Mizoram pawhin kan chhawr tangkai ve tawh hle.

He lehkhabu 'Vân lam hun' hi ka lehkhabu ziah hmasa ber, kum 1988-a chhuah tawh a ni a.

Kum 1991-ah a chhung thu ennawnin chhuah leh a ni a. Tûnah hian thar thawh lehín, ka han buatsaih leh ta a ni e.

A chhuah vawi hnihna atanga chhûtin kum sawmhni leh pahni dawn lai a lo vei tawh avangin vân sâng lama hmasâwnna leh thil thar tam tak ziah belh tur a lo awm hman tawh a; chu vangin a bu hming ngai hmang mah ila, lehkhabu thar ang mai a ni e.

Vân sâng lama hmasâwnna chanchin hi mi pangngai chin chuan a tlangpui tal kan hriat thain ka hria a; chuvangin a duh apiang tâna chhiar theih turin ka han buatsaih leh a ni e. He lehkhabu hi ka buatsaih chhan mizo zirlaite leh mizo mipuite tân Vân sâng lama hmasâwnna chanchin hriatna kawnga puitu a nih ngei ka beisei.

Dated Aizawl
the 10th Aug., 2013


(Dr. R.K.LALLIANTHANGA)

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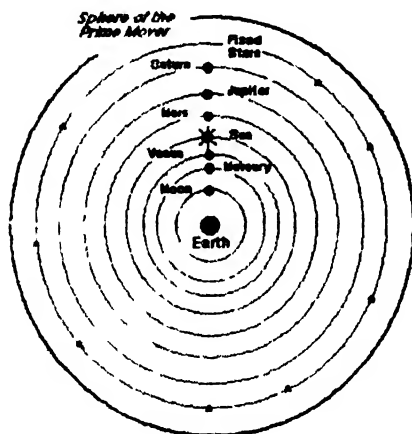
HMASÂWNNA KÂWL ÊNG

I Hmânlai mite chuan kan awmna lei hi a phêk niin an ring a, nî leh thla leh arsite khian an hêl niin an ngai a. Arsite pheï khi chu nî leh thla aia tê zawk daih niin an ngai a ni. He ngaih dân hi khawvêl hmun hrang hranga mite ngaih dân tlanglawn ber a ni a, mizo pi leh pute ngaih dân nên pawh a inang thawkhat viau awm e. Hmânlaiin India ram hmun thenkhata mite chuan lei hi ban lian pui pui sâwm leh pahnih chung a innghat niin an ngai a. Khawvêl hmun thenkhatah chuan sai lian pui pui pali chung a innghat niin an ngai thung. Thenkhat chuan satel lian pui hian tui a hleuh va, chu satel chungah chuan kan awmna lei hi a innghat niin an ring bawh. Kum BC 600 lai vêla vân lam chanchin zir mi hmingthang tak, Greek mi fing Thales-a pawh khan lei hi a phêk niin a ngai ve tho mai.

Ngaihdân thar a lo chhuak tan

Hun a lo kal zêl a, kum BC 340 bâwr vêla Greek mi fing Aristotle-a chuan, lei hi a phêk ni lovin a mûm a ni ang ãih rinna nghet tak a lo nei ta a. Âwkin thla a lem hian, thlaa thil dum lo lang hi lei hlim niin a hria a. Lei hi a phêk a nih chuan thlaa lei hlim hi a sâwla a lan châng a

awm tur a ni a; âwkin thla a lem apianga a hlim a bial ziahna chhan hi lei mûm vâng ni ngeiin a hria a Nimahsela, ani pawh hian lei a mûm a ni tih ring mah se, lei hi vân lai takah awm niin a hria a, ni, thla, planet-te (ni hêltute) leh arsite khian hla tak atangin an hêl niin a ngai a; lei hi a lai taka awm anga tûn hma lama mite'n an lo ngaih dân chu a pawm dân a ni ve tho mai.



Aristotle-a universe ngaih dân

Kum BC 280 a lo nih chuan Erotosthenes-a chuan lei a mûm a ni, tih a ngaihtuah chhuak a; lei lenzâwng pawh a chhût chhuak thei ta hial a. A hnu kum BC 270 lai vèl khan Greek vân lam chanchin hre mi leh chhiarkawp thiam Aristarchus-a chuan hmanrua engmah lamang lovin, kan awmna lei hian nî a hêl a ni, tih ngaih dân a lo nei bawk ni a hriat a ni.

Aristotle-a ngaih dân hi mifing tak mai, Ptolemy chuan kum AD 140 khan a rawn tîlâr ta hle a, a hma aia chiangkhang deuh leh thûk zâwkin a rawn hrilhfiah a. Lei hi a lai takah a awm a, a hnai berah thlain a hêl a, a dawtah, hetih laia an planet hriat Mercury, Venus (Chawngmawii), Mars (Sikeisen/Siaia), Jupiter (Hrangchhuana) leh Saturn ten hlat dân indawtin an hêl bawk niin a chhût chhuak a. Hetih lai hun hian planet dang - Uranus leh Neptune te hi an la hmu chhuak lo va. Nî hêltute hian nî an hêl a nî tih pawh hriat a la nih loh avângin an hmingah pawh 'planets' tih a ni a; chu chu vâkvêl-ho (wanderers) tihna a ni. Ptolemy-a pawh hian nî khian kan lei hi Sikeisen leh Chawngmawii inkâr atangin a hêl ve niin a ngai a, arsîte khi chuan hla tak atangin, a huhovin lei hi an hêl niin a ngai bawk.

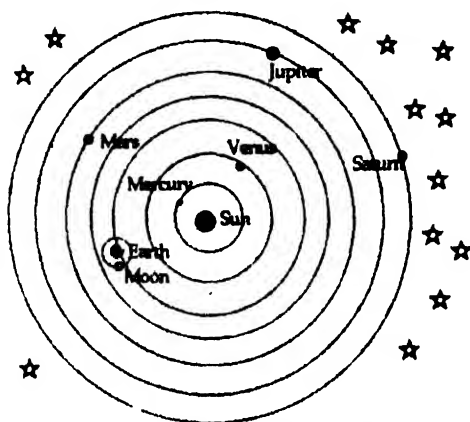
Ngaihdân danglam tak chu!

Mi tam takin Ptolemy-a ngaih dân chu mak an tiin, thûk an ti veng veng hle a, ngaih dân thûk zâwk a awm leh thei ang tih pawh an ngaihtuah phâk lo a nî âwm e. Hun rei fe hnu, kum 1543 khan Polland rama puithiam pakhat, Nicholas Copernicus-a chuan khawvêl nghawr nghîng dawt khawp ngaih dân danglam tak a lo nei ta a. Chu ngaih dân thar chu 'Nî khian kan awmna lei hi hêl lovin, lei hian nî khi a hêl zawk a nî,' tih a nî ta tlat mai le! Sakhaw puithiam a ni a, kohhrana a rawngbawlpuite ngei pawhin



Copernicus

an ngaithiam dawn lo tih a hriatsa avangin, a ngaih dân chu a tlangzarh lawk ngam lo va; nimahsela, thil dik ngei nia a hriat tlat avangin a ngawi thei ta ngang lo va, vântlang hriatah a puangzâr ta a.



Copernicus-a universe ngaihdan

Ti chuan le, a rin lâwk ang ngeiin a hun laia mifing tam takin an pawm thei lo va, kohhran hruiatute pheichuan Pathian thu nena inkalh nia ngaiin an do nasa ta hle mai a. Hetih hun lai vêla mi fîng, Giordano Bruno-a pawh Copernicus-a ngaih dân tawmpui tlattu a nih avangin Rom khawpuiah kum 1600 khan kohhranhovin an hâl hlum ta hial a.

Planet-ten ni an hêl tih hriat a ni ta

Kum zabi sâwm leh parukna tâwp lamah vân lam chanchin zir mi ropui tak Tykho-a a lo lang ve leh a. Tykho-a hian kum 1576 khan Baltic tui puia thliarkâr pakhat Hven-ah arsi enna khâwl a bun a, arsi hlut vâwng leh planet-ho kal kual dân a zir ngawrh hle a, a bikin Sikeisen kal dân pheichu a zir ngun hle. Amaherawhchu,

a hmaa mite ang bawkin planet- te hi nî vêlah an inher a ni, tih a hriat chhuah theih loh avangin ngaih dân thar mûmal leh awmze nei tak a chhar chhuak thei ta lo va.

Tykho-a thih hnu hian amah lo puibăwm thintu, German mi Johannes Kepler-a chuan a hna chu a chhunzawm ta char char a. A tâwp atăwpah chuan lei leh planet dangte hian mahni kawng theuhvah nî an hêl a ni, tih a chhût chhuak ta hlah mai! Chu băkah chuan planet hovin nî an hêlna kawng hi a bial ni lovin a sâwl a ni, tih pawh a chhût chhuak ta baw a.

Planet thenkhat hêltu thla hmuh chhuah a ni

Kum 1609-ah zirtirtu lâr tak Galileo Galilei- a lo lang a. Ani hian ama entlang siam hmangin Jupiter hêltu thla hmuh awl deuh pali - Io, Ganymede, Europa leh Callisto te chu a hmu chhuak ta a. Ti chuan, vân lam chanchin zirna hmanruate pawh a lo changkâng ve telh telh a, entlang (telescope) chuan vân lam chanchin zirna kawngah hma nasa takin a sâwn tîr a.



Galileo-a leh a Telescope

Galileo-a hi Copernicus-a ngaih dân tawmpuitu a nih avangin Rom khawpuiah kohhran hruaitute'n an kova, a ngaih dân sût turin nasa takin an thlêm a. Nimahsela, ani chuan, "Pathianin thil dik chu a hria alâwm, kan awmna lei hian nî khi a hêl ngei a nî," tiin a tang ta tlat mai a. Tih ngaihna dang an hriat tâk lovah chuan a ngaih dân chu mipui hnêna a tlângzarh zêl loh nân a thih thlengin ngun takin an vêng ta tlat a. Ti chuan, hrehawm tak tuarin kum 1642 khan khawvêl a chhuahsan ta a.

Kum 1655 khan Dutch vân lam chanchin zir mi Christian Huggens-a chuan Saturn hêltu thla panga zînga a lian ber Titan a hmu chhuak a.

Thlasik kawnga mi kan lo nî ve reng mail

Kum 1781-ah William Hershael-an nî hêltu zînga pakhat dang, Uranus a hmu chhuak a. Chu bâkah, kum 1805 khan Herschael-a bawk chuan ru leh a vêla inherte (Solar System) hi Thlasik kawng (Milky Way)-a arsi maktaduai tam tak zînga tel ve mai a nî, tih a hmu chhuak ta tlat mai. Nî pawh tu, chung arsi tam tak zînga arsi narân ve mai a nihzia leh arsi dangte aia kan awmna lei a hnaih avang maia lang lian a nih dân tē pawh kan lo hre ta zêl a.

Thla mang lai, thlasik khaw thian that kêk kâwk zânah chung langhan thir vang vang la, arsi bit tak, paw chûk mai, vân dung zai zâwna inkham ruah i hmu ang. Hei hi thlasik hun laia a lan chian bik avangin, Mizo pi



Kan awmna thlasik kawng (Milky Way) ang tak chu

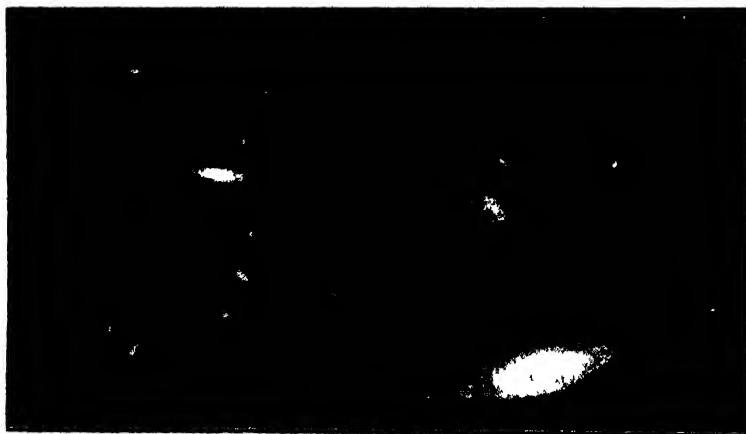
pute chuan 'Thlasik Kawng' tiin hming an lo vuah a. Nî leh kan awmna lei leh planet dangte hi he Thlasik Kawnga tel ve tho hi an ni a. Thlasik kawng kan hmuh thin hi a lai hawl, arsi bitna lam a ni. Keini hi a lai atanga tlêma a pâwn lam deuhva awm kan nih chu .

Thlasik Kawng lenzawng hi a laia hawlh tlangin light year 100,000 vel a ni a. Eng hi second khatah km 300,000 vel a kal thei a; kum khatah chuan km. 9,460,000,000,000 a kal tihna a lo ni a. Chu mi awmzia chu chu light year khat chuan km. 9,460,000,000,000 a tluk tihna a ni a. Chuti a nih chuan, kan awmna Thlasik Kawng lenzâwng chu a laia hawlh tlangin km 9,46,000,000,000,000,000 a nih chu! Kan lei leh planet dangte hi Thlasik Kawng lai hawl atanga a pâwn lam light year 32,000 vèlah kan awm a. Kan lei leh nî inkâr te hi

chu hnai te a ni, light year khat a tling pha lo chawh pawh ni lovin, minute 8 leh second 3 chhungin engin a thleng thei. Hei mai pawh hi kilometer-a han chantir chuan km 1,49,407,000 lai a tling zu nia! Heta tang hian light year awmzia leh Thlasik Kawng zauzia chu kan hmathiam mai awm e.

Arsi bâwr (Galaxy) chhiar sên rual loh chul

Kum zabi sawmhrühnaah hriatna a lo pûng deuh deuh va. Kum 1925 a lo nih chuan America rama van lam chanchin zir ni Edwin P. Hubble a chuan van boruak zau takah hian kan Thlasik Kawng bâkah arsi bâwr dang maktaduai tam tak a awm a ni tih a lo hmu chhuak leh ta a.



Universe-a galaxy tam tak

Georges Lemaître-a phei chuan kum 1927-1929 chhung khan he van boruak zau taka arsi bâwrte hi a tira an insiam tanna humun atangin chak mang khêngin a hla zâwngin an thlawk zut zut a ni, tih a chhût chhuak leh ta

bawk. Kan awmna Thlasik Kawng pawh hi a chhunga arsi leh thil dang awm zawng zawng nen hian second khatah km 600-a chakin a thlâwk reng a ni, tih a chhût chhuak ta bawk.

Ti chuan, mihring finna lo sâng zêl avangin, vân lam chanchin hriatna kawngah hmasâwnna kâwl a lo êng chho tan ta a. Kan tarlan tâk bâkah khian kum 1687-ah scientist



Isaac Newton

ropui leh hmingthang Issac Newton-an a lehkhahu *Mathematical Principles of Natural Philosophy*-a vân boruaka thil inhîp tawn dân leh chêt vêl dân Chiang taka a hrihfhah te, kum 1846-ah John Couch Adams-an nî hêltu dang Neptune a hmu chhuah te leh kum 1905-a scientist ropui Albert Einstein-an hun leh boruak (space) inlaichin dân *Special Theory of Relativity* a chhût chhuahte chuan vân boruaka thil awm dân hriathiamna nasa takin a tipung a, vân lam chanchin hriat dân pawh a ril sâwt ta hle.

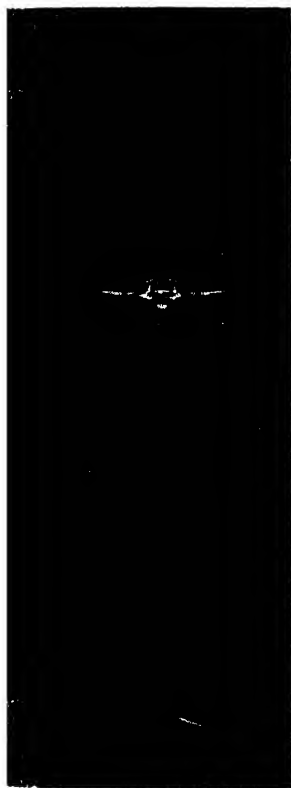
Ngaihdân thar berah phei chuan tâna vân kan hriat, universe hi universe tam tak zînga pakhat nia rin a ni leh ta zêl mai. Chuti a nih phei chuan Stephen William Hawking-a te Carl Sagan-a te anga mi fing leh mi ril pawhin theih tâwpin han chhûtin, hriat belh eng emaw chen chu nei thin mah se, vân zau zâwng hi keini mihringte chhui chhuah phâk rual loh niin a lang ta.

Eng pawh ni se, he lehkhabuah hi chuan vân lam chanchin ril leh thûk tak kan chhui dâwn lo va, bung hnihna atang chuan vân sâng boruak (space) tia kan sawi mai, kan lei tuamtu boruak (atmosphere) piah lam tin zâwna khawvêl ramte, a bîkin sorkar chak leh thil titheiten kawng hrang hranga hma an lăk dân chanchin, rocket hmanga thla lem leh boruak lawng kâp chhuaka, lei leh vân chanchin zira hma an lăk chhoh dân kan thlûr bing dâwn a ni.



2

VÂN LAM HUN LO INȚAN DÂN



Vân lam chanchin hriatna lamah hma sâwn zêlin, vân lam chanchin zirna atân entlang (telescope) tha tak takte pawh siam chhuak mah se kan lei tuamtu boruak (atmosphere) chhah tak avang hian vân lam thlîr a fiah tak tak thei lo va. Chu vangin lei tuamtu boruak pawns lam ațanga vân lam chanchin zir leh he kan awmna lei chanchin ngei pawh ngun taka zir theih a chhâkawm hle a.

Vân sâng boruak (space) han tih hian a nihna takah chuan lei tuamtu boruak (atmosphere) piah lam a kâwk ber a; amaherawhchu atmosphere huam chhung la ni si, a chuan chung lam, a tângpuiin km 100 piah lamah khian boruak (gas) a tlêm êm êm tawh a, thlawhtheihnate pawh a thlâwk

thei tawh lo va. Chu vangin he lai hmun *Karman line* an tih chung lam hi a nawlpuia khawvêl ram hrang hrangin vân sâng boruak (space) intanna anga an pawm chu a ni. Ti chuan, mihringin rei tak chung theih tâwpa a beih hnua he lai hmun pêla, rocket hmanga thla lem a han dah theih hun kha vân lam hun (space age) lo intanna chu a ni a.

Vân lam zin thawnthu

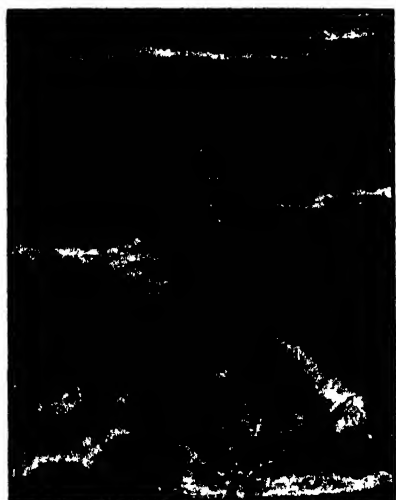
Mihringte suangtuahna leh ngaihtuahnate hi thawnthuah a lo lang fo thin. A taka thil zirna leh chhûtna hi hmasâwnna thlentú a nih rualin thawnthu awmze nei tak takte hi a tak hlim thla, hmasâwnna thlentú pawimawh tak a ni ve fo mai.

Kum zabi pahniha hun laia Greek thu ziak mi hmingthang tak Lucian-a chuan thlaa zin thawnthu ngaihnawm takin a lo ziak tawh a. A thawnthuah chuan, lei atanga han zinte leh thlaa lo chêng, mulukawlh lu pathum neia chuangte chu nasa takin an inbei a. Lucian-a hian, mihringte hian thla kan thleng thei tak tak ang tih a ngaihtuah phâk lo va, thla hlat zâwng pawh a hre bawh lo va.

German mi, chhiarkawp thiam tak Johannes Kepler-a, nê hêltu planet-ho inher dân hmu chuaktu pawhin, a thawnthu 'Tawrmang'-ah chuan, thliththihna mak tak avanga thlaa zin thu a ziak bawh a. Kepler-a hi kum 1571 atanga kum 1630 hun lai daiha mi tawh kha a ni a; vân sâng boruakah khian awlsam taka thlawh theih a nih lohzia a hre Chiang hle tih a thawnthu atang hian a hriat theih a.

Kum 1638-a Francis Godwina'n 'Mihring Thlaah' tih thawnthu a ziah pawh thawnthu ngaihnaawm tak a ni âwm e. He thawnthuah hian, Domingo Gonsales-a leh a chhiahhlawh chu thlaah an han zin a; thla chu kan awmna lei ang mai lo niin, tui leh nungcha rawng mak pui puite an han hmu a.

Kum 1865 khan French mi Jules Vern-a pawhin thlaa zin thawnthu baw a ziaak ve leh a. A thawnthuah chuan,



laipui ft 984 zeta sei hmangin silaimu kawrawng lian tak an kâp chhuak a. Chu silaimu chhungah chuan mihring pathum leh ui pahnih an chuantîr a. An silaimu kal chak zâwng chu second khatah km 11.5 a ni a; chu chu a takah pawh kan lei hîpna atanga tâl chhuak tura vân sânga thil kah chhuah kal chak zâwng

atân a tâwk chiaah a; chuvangin ngaihtuahna ril tak atanga thawnthu phuah a ni tih a chiang hle. Nimahsela, chuti ang laipui lian leh kah nâ chu han siam rual a ni loh avangin chu thawnthu chu a taka han chantîr theih a ni lo va, laipui pawh chu lo siam thei ta teh rêng pawh ni ila, silaimu kawrawng kha, a chhunga chuangte chawpin boruakah a kâng ral mai dawn a ni. Chu vangin thawnthu

tingaihnaawmtu atân mai lo chuan a taka han tihhlawhtlin chi a ni lo.

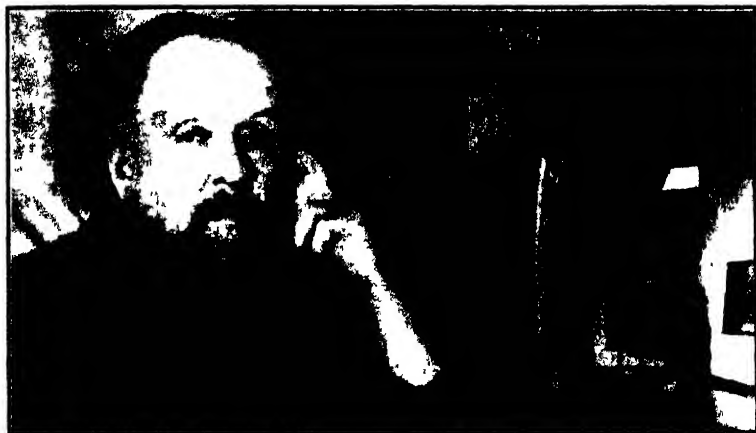
Thil mak tak mai erawh chu, he thawnthua laipui kah chhuahna hmun atâna a hman hi tûna America rocket kah chhuahna hmunpui, Cape Caneveral bul lawk hi a ni tlat mai! Laipui an siamna hmun pawh tûna vân sânga thla lem leh boruak lawng an kah chhuahte an enkawl na hmunpui, Goddard Space Flight Centre hi a ni tlat baw! Hma thlîr tha tak neiin, thil eng emaw tak zawng lo hriat lâwk a nei ni ngei tur a ni.

Kum 1869-a Edward Everett Hales-a thawnthu 'Leirawhchan thla lem' chu lei hêl tura thla lem kah chhuah chungchânga thawnthu hmasa ber a ni âwm e. He thawnthuah hian, leirawhchana siam thla lem, a lai hawlh tlanga ft 200 laia lian chu thil vir chak tak hmanga vân sânga thawh chhuah tura ruahman a ni a. Chutia thawh chhuak tura an inbuatsaih mêk lai chuan, an la inrin hmain, khâwl chu a yîr ta vak mai a; ti chuan, a siamtute leh anmahni rawn tlawhtu, an chhungte chu thla lem chuan vânah a thlawhpui ta niin, nuihzatthlâk ang reng takin a ziaak a.

Kum 1897-a H.G. Wells-a thawnthu 'Khawvêlte Indona'-ah chuan Sikeisena mite'n leia mihringte an rawn rûn thu ngaihnaawm takin a ziaak a. Wells-a bawh hian, kum 1901 khan 'Thlaa Mihring Hmasa Ber' tih a ziaak leh a. Thlaah khian hnimte tovin, nungchate pawh awm ve angin a thawnthuah hian a ziaak a.

Văn sâng zin dân ngaihtuah chhuah a ni ta

Wright-a te unauvin thlawhtheihna an siam chhuah hma daih khạn, Russia rama chhiarkawp zirtirtu Konstantin Eduardovich Tsiolkovsky-a chuan, lei tuamtu boruak 'atmosphere' kal pêla boruak lawng thawng theih dân kawng a lo hmu chhuak daih tawh a. Tsiolkovsky-a hi kum sâwm mi lek a nih laiin a beng a chhêt hlah mai a.



Tsiolkovsky

A hma pawhin naupang tual lîm lo tak a ni a. A beng a chhêt hnu phei chuan in chhunga tawm chet chet leh thil ngaihtuah veng veng lam chu nuam a tih zâwng ber a lo ni ta a. Scientist ropui Isaac Newton-a lehkhabu leh Vern-a thawngthu ziahte chhiarin, văn sâng boruaka zin theih dân tur kawng a suangtuah ve thîn a. Ngun taka a thil ngaihtuah thîn chu a rah a duhawm tak a lo lang ta reng mai. Kum 1903 a lo ni a, Tsiolkovsky-a chuan zên hmang lo va, hydrogen tui leh oxygen tui inchawhpawlh

hmanga rocket kah chhuah dân tur a ngaihtuah chhuak ta hlau mai a. Chu chauh ni lovin, rocket chhâwng (multi-staged rocket) siam dân pawh a ngaihtuah chhuak leh ta zêl a.

Hetih lai hian Ukraine mi Konchatyuk-a chuan kum 1919 khan vân sâng zin chungchang leh vân sâng chanchin hriat theih dân tur a ziaak a; chu chu a hnu daihah America-in thlaa an lawnna kawnga thil pawimawh tak a tling ve bawk a.

Tsiolkovsky-a hi vân sâng rocket thawh chhuah dân ngaihtuah chhuaktu ni mah se, a taka rocket siamtu leh bul tumtu zâwk chu America mi Robert Hutching Goddard-a a ni thung. Goddard-a hian Wells-a leh Vern-a thawnthu a chhuah atangin vân sâng zin theih dân tur chungchâng hi a lo tuipui êm êm thîn a. America rama Clarke University-ah Physics subject-a zirtirtu thiam tak niin, heta a thawh pah hian rocket siam hna ngawrh takin a bei a; a tâwp a tâwpah chuan hlauhtling takin tuialhthei hmang rocket chu a siam chhuak thei ta hlauh mai a. Ti chuan, a hna chu chhonzawm zêlin, rocket chhâwngte pawh a siam thei ta a. Sum lamah harsatna a neih avangin Smithsonian Institution-ah tanpuina tlêm azâwng tal a hmuh theih mial beisein, lei tuamtu boruak chung lam zir nâna rocket a tangkai dân tur ziaakin, tanpui dîlna a thehlût a. Vannethlak takin tanpuina chu an lô pe thei ta hlauh mai a. Ti chuan, a hna ropui tak chu hlim takin a thawk chhonzawm thei ta a. Rocket chungchâng a ziah leh thla thleng hiala rocket thawh theih dân kawng a ziah

chu chanchinbu mite'n an lo hmuhin an hlut ta hle mai a, Goddard-a rin phâk bâkin an vawrh lâw ta hle a.

Kum 1926, March ni 16 a lo ni a, Goddard-a chuan khawvêla tuialhthei hmang rocket hmasa ber chu a kâp phhuak ta dêr mai! A vawi khatna a la ni bawka, a thleng lawi terh tawrh hle; ft 41-a sâng a han thleng thei âwrh a. Eng pawh ni sela, a hlawhtlinna hi vân sâng lam hmasâwnna atân rahbi pawimawh tak a lo ni ta a ni.



Goddard-a leh a Rocket

Goddard-a chuan rocket enchhin hna chu ngawrh takin a bei chho zêl a. Hetih lai hian thlawhtheihnaa thlâwk mi hmingthang tak, Charles Linobergh-a chuan a hnathawh chu a lo hria a, a phûrpui hle a. Ti chuan, he pa hian tanpuina pe theitu tur awma a rin, Dâniel Guggenheim Fun hnên atangin tanpuina hmuh

theih dân kawng a dapsak ta a. Vânehthlâk takin anni hian tanpuina an lo pe thei leh ta hlah mai a. Ti chuan, zirtirna hna a thawhna hmun Clarke University chu chhuahsanin, New Mexico lamah a pêm ta a. Chutah chuan amah tanpuitu mi palite nen rocket siam lam chu a bei leh ta ngar ngar a; km. 2 laia sângte pawh an rocket

siam chuan a thleng thei ta hial a. Rocket tha zâwk buatsaiha a buai leh char char laiin, vânduaithlāk takin Indopui pahnihnain a nangchîng ta hlauh a, a hna a chhonzawm thei ta lo va.

German-hovin rocket an siam ve

Indopui pahnihna hun lai hian German-ho chuan rocket siam dân an lo thiam ve reng tawh a. German mi Hermann Julius Oberth-a chuan vân sâng a thlawh dân tur a ngaihtuah chhuah chu lehkhabuah ziakin a vawrh darh a; chu chuan German-ho chu a tiphûr hle a. German khawpui Berlin-ah chuan rocket siamtu pâwl, German Society for Space Travêl a awm a. He pâwlah hian engineer zirlai thiam tak pakhat, Wernher von Braun-a a awm a. He tih lai hi kum 1930 a ni a; German sipai hovin indona hmarraw thar an dap reng lai a ni a. Ti chuan, an



German V-2 rocket

sâwm angin Braun-a chuan sipai Captain Walter Dornberger-a chu rocket siamna lama thawhpui turin a zâwm ta a. A tîrah chuan Berlin khaw bul lawkah an awm a, kum 1937-ah Baltic tuipei kama Peenemundee-ah an insawn a; chu lai hmunah chuan rocket V-2 an siam chhuak ta a ni.

He rocket hi a hun lai atân chuan a lian ve hle; a sân zâwnng ft 46 niin, a rih zâwnng pawh ton 12.5 lai a tling a. Chuti chung chuan he rocket hi thil ton khata rit vân sâng km 320 thleng thlawh chhohpui thei tura ruahman a ni a. He rocket nawr kaltu atân hian zu (alcohol) fir tak leh oxygen tui chawhpawlh hmang tura ruahman a ni bawk.

Kum 1942, October ni 3 chuan V-2 rocket chu hlawhtling taka kah chhuah a lo ni ta a. Km. 190 laia sâng han thleng chhovin, ri aia chaka thlâwk thei rocket kah chhuah hmasa ber a lo ni ta a ni. V-2 rocket siam hna chu tlâng pakhat, Hartz-ah a rûk têin an bei char char a; ti chuan, kum 1944, September thla khan rocket sângnga lai chu hman theih mai turin an siam hman a. Nimahsela, Indopui pahnihaa atân chuan an hmang hman lo chiah a. Chuti ang a lo nih tak si-ah chuan Braun-a chuan a tîra a lo tum tak zâwk, kan awmna lei kahna ni lovin, vân sâng zin theihna tura rocket siam turin tan a la ta sauh sauh a, rocket chhâwnng thum neite pawh a siam thiam ta hial a.

German thiamna America leh Russia-in an la chhâwnng

German sorkâr a lo tlawm ta a, Indopui pahnihaa a lo tâwp ta a. Braun-a leh a hote chu America sipai kutah

awmin, New Mexico lamah hruai an ni a. Hetah hian rocket V-2 bawk an siam chhunzawm leh ta a. Kum 1946 chhung hian America scientist-te chuan V-2 rocket hmang chuan enchhinna hrang hrang an ti a. Kum 1946 October ni 24 chuan chu V-2 rocket hmang chuam lei chung boruak mël 65 atangin lei thlâ an la thei ta a; vân sâng atanga kan awmna lei thla lăk hmasa ber a lo ni ta a. Kum 1947-ah America chuan V2 rocket hmangin tho chi khat fruit fly-te an kâp chhuak a, hriat theih chinah leia thil nung zingah vân boruaka zin hmasa ber an lo ni ta a. Heng thote hi an awmna bâwm nen parachute hmangin dam takin lei lamah an lo kîr leh a ni. He an enchhinna hi vân sângah nî zungin thil nungte a nghawng dân hriatna atâna tih a ni.

Kum 1948 June ni 11 khan America Air Force Aeromedical Laboratory chuan V2 rocket siam danglam hmangin zâwng chi khat, Albert tia an koh chu vân sângah an kâp chhuak a, vânduaitlak takin lei tuamtu boruak a thlawh pelh hmam mël 39 vêla sângah he zâwng hi a thi ta hlah va.

Kum 1949 February ni 24-ah America chuan Rocket chhâwng hnih chi hlawhtling takin a kâp chhuak leh ta a. He rocket hi a hmaa rocket an kah chhuah tawh zawng zawng aiin a thlâwk chak a, dărkâr khatah km 8288 a thlâwk thei a. A hmaa rocket an kah chhuah tawhte khûmin, vân sâng km 393 laia sâng a han thleng a.

Kum 1949 June ni 14 khan Albert pahnihna an kâp chhuak leh a, mël 83 (km 134) a sâng a han thleng a. Lei

tuamtu boruak thlawh pêlin, vân sâng boruak a han thleng a; mahse ani pawh a lo kîr leh lamah a thi ve ta tho va. A hnuah zâwnng dang pahnuh an kâp chhuak leh a, anni pawh an thi zêl a.

Zâwnng hi mihring hnaih tak an nih avangin science lam thil enchhinaah mihring ai awh atân hman an ni fo thin a. Ti chuan heng zâwnngte hian keini mihringte vân sâng kan zin theih dawn leh dawn loh lo zir lâwkna atâna an nunna an hlân, kan ti thei ang. Heng zâwnng an kah chhuah hi thil chhinchhiahtlak tak a ni a; amaherawhchu a hun laiin puanzâr a ni lêm lo va, khawvêl ram dangin an hriatpui lutuk lo nîin a lang.

Kum 1950-ah Braun-a chu Huntsvill-a missile siamna hmunah rocket siam lam hna thawk tura tirh a ni a, helai hmuna a thawh hnu hian rocket 'Redstone' an tih chu an siam chhuak a. He rocket hi America tân chuan vân lam hmasâwnnaa thil pawimawh tak a lo ni ta a ni.

Russia ramah pawh Tsiolkovsky-a thurochhiah kha a la châm reng a. Kum 1920 atangin engineer pakhat Fridrikh A. Tsandar-a chuan tuialhthei hmang chi rocket a buaipui ve char char a, enchhinnate pawh a nei thin a. Kum 1945 hnu phei kha chuan Glushko-a te, Korolyov-a leh Tikhonravov-ate'n hma hruaiin, Russia chuan chak takin hma a sâwn chho ve zêl a.

Peenemunde-a awm German mi, rocket lam thiamho kha America sipaiten an kha awm vek avangin, Russia chuan ama thiamna liau liauva hmasâwnna kawng a dap chhoh a

ngai a. Amaherawhchu, vânnethlâk takin German-ho rocket V-2 kha an man ve hlauh mai a, chu chu entawnin German-ho thil thiam tam tak an man chho ve thei ta tho va. Ti chuan, enchhinnate neiin, rocket siam hna chu an bei char char a. Kum 1953-a bomb hlauhawm tak 'Hydrogen bomb' an siam theih tâk hnu phei kha chuan namên lovin hma an sâwn chho ta a ni. Kum 1957 August thla a lo nih chuan Russia chuan enchhinna hlawhtling tak a nei ta a. Hetiang rocket hmang hian thla lem pawh lei hêl turin vân sâng boruakah a dah theih ngei a beisei ta a. Hetih lai vêk hian America sorkâr pawhin ualau takin thla lem kah chhuah thuai a tum thu a puang ve dup dup baw k a.

Vân lam hun a inñan ta

Kum 1957, October ni 4 a lo ni a, Russia chuan Aral tuipui hmar lama Tyuratam khaw bul lawk atangin



Sputnik 1

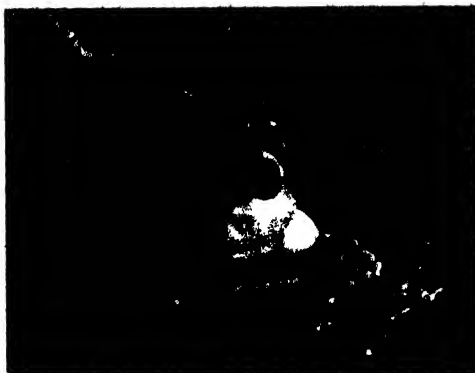
khawvêl thla lem hmasa ber phurtu rocket chu a kâp chhuak ta dur mai le! An kah chhuah ațanga minute sâwm lekah chuan rocket chuan thla lem hmasa ber Sputnik 1 chu lei hêl turin vân sângah a han dah thei ta hlauh mai! Ti chuan, vân lam hun, a sâp tawnga 'Space Age' tia kan sawi thîn chu a lo intan ta reng mai!

Sputnik thu mal hi Russia tawnga thla lem tihna tho a ni a. He thla lem hi a mûm a ni a, a laia hawhltingin inchi 23 niin, a rih lam pawh kg. 83 a ni. He thla lem hian minute 96 chhungin kan lei hi vawî khat a hêl chhuak hman a. A hêlna kawng hi a sâwl a nih avangin lei ațanga a hlat lai berin km. 940-a hlaah a awm a, a hnaih ber lai chu an km. 215-a hlaah a awm thung. He thla lem hian radio signal thawm chhâwng theitu khâwl (radio transmitter) tê reuh tê a keng tel a; chu bâk chu thîl zirna hmanraw dang a keng hranpa lo va.

Russia thla lem kah chhuahnaa a bul tumtu chu Ukraine mi Sergei Korolev-a a ni tih hi tam tak chuan kan hre lâk vak âwm lo ve. A hnathawh ropui tak avang hian a hming hi Russia ramah mai ni lovin, khawvêl huapa vân sâng lama hlawhtlinna chanchin ziahnaah a reh tawh lo vang.

Sputnik 1 hlawhtling taka kah chhuah a lo ni ta mai chu khawvêl mipuiin an lawmin, mak an ti hle a, radio leh chanchinbu a luah hneh hle. Tûnlai hun thlengin he vân lam hun lo ințanna champha hi Russia ramah chang ni lovin, khawvêl ram hrang hrangah ni pawimawh leh chhinchhiah tlâkah ngaiin an la lawm thîn a, a champha a

lo thlen apiangin khawvêl ram hrang hrang atangin Russia sorkâr hnênah lawmpuina thu an thawm chur chur thin. Sputnik 1 hi a awmna a sân tâwk loh avangin lei tuamtu boruakin a la tibuai thei tlat mai a. Ti chuan, a lo chak lo tial tial a, kum 1958, January ni 4 khan boruakah a kâng ral ta a ni.



Sputnik 1 an kah 'chhuah hnu thla khat lek, November ni 3 a lo ni a, Russia chuan a hma aia lian zâwk thla lem, Sputnik 2 chu an kâp chhuak leh ta nghal a, khawvêl mipuiin mak an ti

tak zet a ni. Hemi tum pheh hi chuan ui pakhat 'Laika' an kâp chhuak tel nghe nghe. Ti chuan, he ui hi khawvêl thil nung zînga vân sâng aţanga lei hêl hmasa ber a lo ni ta a. A lungphu leh taksa awmdânte lei aţangin ngun takin an lo zir a, chu chuan mihringte hi vân sângah rei tak kan dam ve thei ngei ang, tih rinna nghet tak a neihtîr a. He ui khawhar tak hi lâk kîr leh theih a nih loh avangin a lo chau tial tial a, ni sarîh lei a hêl hnuah a boral ta a; mihringte hmasawn zêlna atân a nunna hlu tak chu a lo hlân ve ta a ni. Ti chuan, Sputnik 2 leh a chhunga Laika ruang awm chu kum 1958 April ni 14 khan lei tuamtu boruakah a kâng ral ve leh ta a.



VÂN SÂNGA INELNA

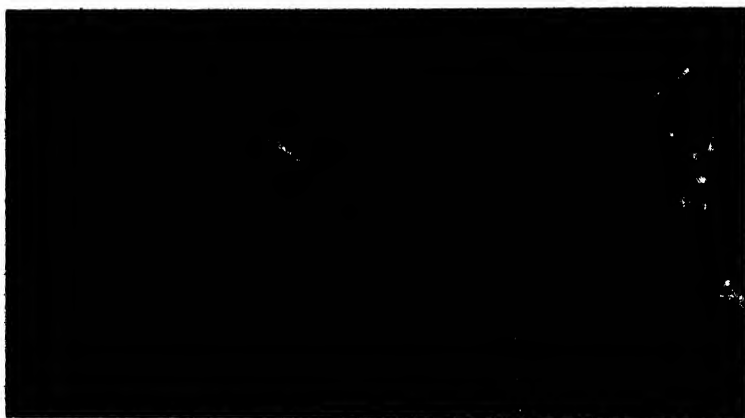
Mihring nun hrim hrimah hian rual elna hian hmasâwnna min thlen fo thin a. Mite aia chungnung zawk nih duhna emaw, rual pâwl ve phâk nih duhna rilru neih tlat hi a pawimawh hle. Rilru dik lova inel erawh a tha hauh lo thung. Chuti ang bawkin khawvêl ram hrang hrangte inelna hian a tha lo zâwngin nghawng nei fo thin mah se, kawng thenkhatah chuan hmasâwnna thlentu pawimawh tak a ni fo thin.

America-in tan a la

Russia-in thla lem hlawhtling taka lei hêl tura a dah thei ta mai chuan khawvêl ram changkâng leh thil ti thei ber leh thla lem kâp chhuak hmasa ber tura lo inngai, America sorkâr chu a barakhaih hle a. Eng pawh ni se, Russia-in hmasa ber nihna chu a chang ta tlat mai a. Heta tang hian, America leh Russia inkârah vân sâng lama inelna ril tak a lo intan ta a ni.

America chuan tan lain, Russia-in Sputnik 2 a kah chhuah hnu thla khat lekah chuan thla lem Vanguard 1 chu kah chhuah a tum ve ta a; amaherawhchu, vânduaithlâk takin a hlawhchham hlah mai a. Chuti ang bawkin Vanguard 2 kah chhuah a tum pawh a hlawhchham leh ta rih a.

Sputnik 1 kah chhuah a nih aṭanga thla hnih leh ni sawmhnih leh palina, January ni 31, 1958 chuan America chuan a thla lem Explorer 1 chu Juno 1 rocket hmangin, a kah chhuahna hmunpui Cape Caneveral aṭang chuan hlawhtling takin a kâp chhuak ve thei ta hlah mai a.



Explorer 1

He thla lem hi kg. 14 leka rit a ni nain thil zirna hmanrua a keng tel a, a ṭangkai hle. Nĩ aṭanga atom nawi tē tē (atomic particles) lo kal, vān boruaka kan lei hual vēla chāmbāng *Van Allen radiation belts* chu a khāwl ken hian a han hmu chhuak a. Explorer 1 hian thla li chhung zet lei lama signal a rawn thawn hnuin a khāwl a thi ta a. A khāwl a thih hnuah pawh lei a hēl reng a, kum 1970 March ni 31, an kah chhuah aṭanga kum 12 zet hnuah khan lei tuamtu boruakah a kâng ral ve leh ta a.

Explorer 1 an kah chhuah hnu hian thla lem Vanguard 1 pawh March ni 17, 1958 khan hlawhtling takin

an kâp chhuak leh a. Lei a hêlna a sân êm avangin lei tuamtu boruakin a tibuai pha lo va; chu vangin, lei atang bawka an han la kîr leh te a nih loh pheï chuan lei a hêl reng tawh mai dawn a ni.

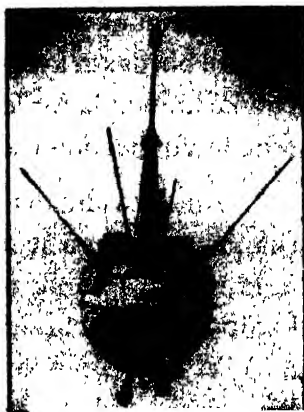
America chuan tân la zêlin inrelbâwlina lama pawh ruahmanna thar a siam zêl a. Kum 1958 July ni 29 a lo ni a, President Eisenhower-a chuan a hmaa vân sâng lam buaipuitu National Advisory Committee for Aeronautics (NACA) chu sipai lam rocket buaipuitu Wernher von Braun-a leh a hote awmna Army Ballistic Missile nen hmun khatah chhûng khâwmin National Aeronautics and Space Administration (NASA) a din ta a. Ti chuan, NASA hian chak takin vân sâng lama hmasâwnna atân hma a la ta a, a hnu lama America vân sâng hlawhtlinna zawng zawngah a bul tumtu a a lo ni ta a ni.

Russia pawhin tan a la zêl

Explorer 1 leh Vanguard 1 hlawhtling taka an kah chhuah theih tâk avangin America sorkâr pawh a thaw huai a. Amaherawhchu, Russia ûm pha ta nia an inngaih lai chuan, rin lâwk loh takin Russia chuan a thla lem, Sputnik 3, ton 1.3 zeta rit chu kum 1958 chuan a kâp chhuak ve leh ta a. He thla lem hian thil zirna hmanrua a keng a, chu chuan *Van Allen belts* pawh a awm ngei a ni tih a han chian a.

Ti chuan, Russia chuan vân sâng lama chungnung zâwk nihna a chan avang chuan a phûr chho hle a, lei hêltu chauh ni lovin thla thleng hiala rocket thawh dân

tur chu a ngaihtuah tan ta a. Chutih lai chuan America pawhin tan a la sauh sauh a. Kum 1959 January thla chhung ngawt pawhin vawi hnih lai thla thleng tura rocket kah chhuah a tum a; mahse, a hlawhchham a. Hetih lai vèk hian Russia boruak lawng kah chhuah Luna 1 pawh chu, lei hîpna atanga tâl chhuak a, thla lam a pan laiin a kawng a bo a, km. 6000 zetin thla chu a thêlh ta



Luna 2

hlauh a. Ti chuan, Luna 1 chuan nî a hêl ta a; nî hêltu lem (artificial planet) hmasa ber a lo ni ta a nih chu. Hemi kum bawh hian September thlaah Luna 2 chu Russia bawkin an kâp chhuak leh a, chu chuan vânnethlâk takin thla a han thleng thei ta a. Mihring thil siam zînga thla thleng hmasa ber a lo ni ve leh a.

Thla khian kan awmna lei a hêl laiin, kan awmna lei anga a axis-a a vir ve loh avangin a pang leh lam chauh kan hmu thei a. A pang leh lam, kan lei chhawn lo lam thlâ la tur chuan kum 1951, October ni 4 chuan boruak lawng Luna 3 chu Russia chuan a thawn leh ta a. He boruak lawng hian thla leh lam thlâ chu chiang takin a han la thei ta a.

Kum 1959 a lo tâwp meuh chuan Russia chuan boruak lawng paruk a tîr chhuak hman a. Chutih lai chuan America phei chuan boruak lawng sâwm leh pariat lai a

tir chhuak hman a. America hian a thawn chhuak hnem zâwk nain a tlangpui thuin Russia chuan hma a la hruai zâwkin, a la hlawhtling zâwk a tih theih ang.

Russia chuan boruaka mihring thawn dân tur a ngaihtuah chho zêl a. Kum 1960, May thla khan Sputnik 4 a kâp chhuak leh ta a. Hemi tuma mihring a thawn lo chu a vâneihthlâk zâwk hle. Sputnik 4 hi leia lo kîr leh tura tih a ni nain, a lo kîr ta awzâwng lo mai a, lei a hêl a hêl ta mai a. Ti chuan, thla nga zet lei a hêl hnuin lei tuamtu boruakah a kâng ral ta a ni. Hemi kum vêk August thlaah Sputnik 5 an kâp chhuak leh a. Hemi tum pawh hian mihring aiah ui pahnih Belka leh Strelka an chuantir leh phawt a. Ni khat chhung vân sâng boruaka lei an hêl hnuin, him takin leiah an rawn kîr thei ta hlah mai a. Ti chuan, beiseina a sâng sâwt ta hle a.

America pawhin mihring chuanna boruak lawng ngei lei hêltir dân tur a ngaihtuah chho ve zêl a. Boruak lawngin vân sâng a tanga lei a hêl hian hma lam zâwnga a thlawhna tha leh leiin boruak lawng a hîpna tha kha a inhu tâwk thin avangin, boruak lawng leh a chhunga thilte leh mihring chuangte chuan an rihna an hloh vek thin a. He thil mak tak mai hi an hre lâwk nachungin, chuti ang dinhmunah chuan mihring tân nung dama han awm theih a nih leh nih loh an la hre Chiang chia h bik lo va.

Mercury leh Vostok Project

America-in mihring chuanna tura boruak lawng a siam Mercury chu chingal thlawr bûr ang deuh a ni a, mi

pakhat chuang thei tura siam a ni. A lian lai ber chu a laia hawlh tlangin ft 6.2 niin, a sei zâwng ft 9.5 a ni a, a rih zâwng ton 1.3 a ni. Russia boruak lawng Vostok chu a mûm a ni thung a. A laia hawlh tlangin ft 7.5 niin, a rih zâwng pawh ton 2.4 lai a ni. Heng boruak lawng pahnihte hi, a siam dân leh pianziate inang chiah lo mah se, hlawhtling taka hman an ni.



Mercury

Vostok

Kum 1961, April ni 12 chuan Russia boruak lawng Vostok chu, a chhunga chuang Yuri Alekseyevich



Gagarin

Gagarin-a nen chuan lei hêl tura kah chhuah a lo ni ta. Gagarin-a chuan lei vawi khat a hêl hnuin him takin a lo kîr leh ta a. Ti chuan, mîhring zînga vân sâng aţanga lei hêl hmasa ber a lo ni ta a ni. Vân sâng a awm lai hian a eiin a in a, thîl a zîak a; harsatna a nei hranpa lêm lo va. Gagarin-a chuan, "Vân sâng a aţanga

lei ka hêl laia ka rihna ka hloh vek lai pawhin insawise'na ka nei lo va, boruak lawng chhunga thil eng eng emaw, a hûna kan hûn maiho chu an lăng a, kei pawh ka thutnaa thu lovin, a chhung boruakah chuan ka lăng ve ta mai a, a hmasa berin kan awmna lei mûm pul chu ka hmu ta a. Văn boruak atang chuan lei atanga en aiin Nî hi a êng zăwk hle a ni," tiin a sawi.

Gagarin-a thlawh chhung hi minute 108 lek a ni nain, mihringin vâs sâng atanga lei a hêl ta mai chu a makin, Sputnik 1 kah chhuah nen khan a lawmawm dân leh a hlutna a dang chuang lo. Russia chu America ai chuan a lawr leh ta lak mai le. America hian a thil tum hi ual-au takin a puangzâr deuh zêl a, Russia erawh hi chuan a rûk tea hma la chhovin, a ti thut thin nîin a lang. Gagarin-a pawh hi vâs sâng lama sûlsutu ropui tak a lo ni leh ta. Amaherawhchu, vawi khat mah vâs sângah a zin leh ta lo va. Kum 1968 khan vâs sângă thlăwk leh tura thil a zir laiin, vânduaithlăk takin thlawhnaah a chesual a, a boral ta a ni.

Thil pakhat kan hriat fo tur chu mi hlawhtling leh langsârte phênah hian mi pawimawh tak an awm chăwk thin, tih hi a ni. Russia vâs lam hmasăwnnaa an thluak bûr ber chu Sergei Korolev-a a ni a; chuti ang bawkin America vâs lam hmasăwnnaa a bul tumtu pawimawh êm êm chu Wernher von Braun-a a ni thung.

**Wernher von Braun****Sergei Korolev**

Gagarin-a'n Vostok hmanga lei a hêl atanga kar hnih lek, May ni 5, 1961 chuan America mi Alan B. Shepard-a chuan boruak lawng Mercury 3 hmangin km. 187 laia sâng a han thleng chho ve thei ta a. Ti chuan, America mi vân

**Alan B. Shepard**

sâng zin hmasa ber a lo ni ta a ni. Shepard-a erawh hi chuan lei a hêl lo va, a thlawh chung pawh minute 15 emaw lek a ni a. Eng pawh nise, vân sângah mihring kan nung ve thei a ni, tih Gagarin-a'n a lo sawi tawh kha a tak ngeiin a han chang ve ta a.

Shepard-a hnua hian America mi Virgil I. Grissom-a chu vân sângah lei hêl bawkin a han zin ve leh a. Ani phei hi chu a thi teuh ther ther hle. A chuanna boruak lawng kha Atlantic tulpuiah a tla a, a pil ta tlat mai a. Vânnethlak takin helicopter hmangin an chhan chhuak thei hrâm a.

America mi pahnih vân sânga an han zin hi hlawhtlinna ropui tak chu a ni nain Gagarin-a'n hmasa ber nihna a chan avang leh han zin satliah ngawt ni lova, lei a han hêl avangin America tân chuan han uanna vak tur a la awm lêm lo va.



Gherman S. Titov

America-in lei hêl tura mihring thawn theih ngei a tum lai mêkin Russia chuan hmasâwnna dang a nei leh ta. August ni 16, 1961 a lo ni a, Gherman S. Titov-a chuan vân sâng atangin lei vawi sâwm leh pasarih zet a han hêl ta mai a. Vân sâng atanga lei a hêl lai hian a eiin a in a, thil eng eng emaw a ti a, a mu bawk a. Thil mak tak mai pakhat erawh chu a hmaa mite la tawn ngai loh vân sâng natna (space sickness) chuan a tlâk buak a, chumi avang chuan rei vak lo chung a lu a hai a.

Vân sâng natna kan tih mai hi a hnua vân sâng zin tam tak harsatna pakhat a ni ta zêl a. A chhan ber ni âwma lang chu, lei an hêl laia an rihna an hloh lai khan an beng chhunga hriatna chuan a thawh tur ang a thawk tha thei lo va, chu chuan harsatna a siam niin an ngai. Vân sânga han zinho zingah pawh tuar nêp deuh leh tuar na deuh an âwm nia hriat a ni. Eng pawh nise, he natna hian rei vak lo hnua a kiansan ve leh mai thîn a. Ti chuan, he vân sâng natna Titov-a'n a han tawh avang hian vân sânga

rei tak zin a theih dawn leh dawn loh pawh hriatthiam a harsa ta hle a.



John H. Glenn

Kum 1962, February thla chuan America mi John H. Glenn-a chuan lei vawi thum zet a han hêl thei ve ta a. Ti chuan, America mi vân sâng atanga lei hêl hmasa ber a lo ni ta a. Glenn-a zin tum hi thil chhinchhiah tlâk tak a nihna lai a awm. Vân sâng a thlawh laiin, a chuanna boruak lawng chu thil mak tak, êng zuai zuai a rawn um niin a hria a. Thenkhat phei chuan,

“UFO a ni ang e” an ti hial a. Amaherawhchu, a hnua a han chhui lêtin, a chuanna boruak lawngin tuihu a phuh chhuah lo êng ta niin an ngai. Glenn-a hian vân sâng atangin tuihnriat tui luan kual dân te, khawpuite leh ram leilung pianziate chiang takin a hmu thei a.

Glenn-a hian lei a hêl laiin, lei lama a khâwlpui chuan thil dik lo awmin a hre ta tlat mai a. A chuanna sa lutuk tur vengtu kâwr chu a thâwl niin a hria a. Vânehithlâk takin a thil hriat hi a lo dik lo hlah a. Lo dik ni ta hlah phei se chuan, Glenn-a chu mihring zinga vân sâng a borol hmasa ber a ni mai dawn a lo ni reng mai

Glenn-a hmu thla thumah chuan M.Scott Carpenter-a chuan vân sâng atangin lei a han hêl ve leh a. Enchhinna mawl tē tē eng emaw zāt a han ti a. A lo kîr leh lamin

tuifinriata a lo tumna hmun tur km. 400 laiin a thêlh nachungin him takin chhanchhuah a ni a. Ti chuan, America chuan Russia chu a umpha ve ta, kan ti thei ang.

Kum 1962, August ni 11 chuan Russia mi Andrian G. Nikolayev-a chu boruak lawng Vostok 3 hmanga lei hêl tura thawn chhuah a ni a. A tûk maiah chuan Pavêl R. Popovich-a pawh Vostok 4 a chuangin, a hmaa mi nena thlâwk dūn turin thawn chhuah a ni ve leh a. Heng boruak lawng pahni h te hi thlâwk dūn, an inhnaih lai berin km. 6.5 dānah an thlâwk a. Ni li hnuah him takin an rawn kîr leh ta a ni. Doctor-te'n ngun taka an enin, heng mi pahnihte hian an rihna an hloh laiin hun rei vak lo chung chu an thirâwl a chauvin an lung pawh a chak lo niin an hria.

Kum 1962 October -ah America mi Walter M. Schirra chuan Mercury hmangin lei vawi ruk lai a han hêl a. Kum 1963, May thlaah Gordon Copper-a pawhin Mercury bawka chuangin dârkâr 36 chungin lei vawi 22 lai a han hêl ve leh ta a. Ti chuan, Mercury programme chu a lo tâwp ta a.



Copper-a thlawh hnu thla khat lek, June ni 16, 1963 chuan Russia hmeichhia Valentina V. Tereshkova-i chu Vostok-a chuangin thawn chhuah a lo ni ve leh a. Khawvêl hmeichhe zînga vân sâng zin hmasa ber nihna a lo chang ta a. Vawi 48 zet mai lei a hêl hnuin him takin a lo kîr leh a.

Ti chuan, hmeichhiate pawh vân sângah an zin ve thei tih chu a lo Chiang ve leh ta. Amaherawhchu, Valentina-i hi vân sângah a zin leh ta ngai lo va, hmeichhe dang pawh Russia hian a thawn leh ta rih lo. Kum 1963 khan Vostok 3-a chuang Andrian Nikolayev-a nen an innei ta nghe nghe a.

Valentina-i thlawh tum khan boruak lawng dang Vostok 5 hmangin Russia mi bawk Valery F. Bykovsky-a chuan lei a hêl ve bawk a. Ani phei hi chuan vawi sâwm riat leh pakhat zet hêlin, ni nga thawthâng vân sângah a thlâwk a, a hmaa mite zawng zawng a khûm a. Ti chuan, Vostok programme pawh a lo tâwp ve leh ta a.

Mercury leh Vostok project a tâwp hnu chuan Russia leh America chu vân sâng inelnaah an intluk thawthâng nachungin Russia chuan hma a hruai deuh zêl a; chu vangin America chuan Russia lehpelh dân a ngaihtuah zêl a.



4

THLA LAMA INELNA



John F. Kennedy

Vân sâng lama hmasâwnnaah hian thla lem hmasa ber kah chhuah atangin Russia chuan hma a hruai deuh zêl a, chutih lai chuan America pawhin tan a la chho reng bawk a; a bik takin America President John F. Kennedy-a chuan a hun laiin Russia an lehpelh theih dân tur kawng a dap nasa hle a. Vân sâng chawlhmun (space station) din a tha âwm mang e, tiin an ngaihtuah that that nain, Russia bawkin a tihhlawhtlin hmasak an ring leh bawk si a.

Ti chuan, Russia lehpêl ngei tura kawng awm chhun chu thlaa mihring ngei han thawn niin an hre ta a. Alen Shepard-a'n vân sâng a han thlen hnu kar thumna, May ni 25, 1961-ah Kennedy-a chuan, kum 1970 hma ngeia America-in thlaa mihring ngei thawn an tum thu a puang ta a. Kawng dangah hma la chho tho mah se, khata tang kha chuan thla lam tinzawna hma lâkna chu a lârin, khawvêl ram ropui leh thil tithei pahnih inelna chu ram hrang hrangin an thlir thup a ni ber mai.

Gemini leh Voskhod Project

Kum 1961-a America President Kenedy-a'n a lo puan tawh angin, kum 1970 hma ngeia thlaa mihring thawn turin America chuan theih tawp chhuahin kawng a dap chho ta a. Boruak lawng hmanga lei hêl mai ni lo, thlaa han tuma, leia lo kîr leh chu a namai lo hle a; chu vangin thlaa intirh tak tak hmain, lo inzir lăwk nân Gemini Project an tan ta phawt a. Gemini boruak lawngte hmang hian vân sâng zin mite chuan boruak lawng dang nena intawh dân te, inzawm dân te, boruak lawng danga pakai dân te leh boruak lawng pawn lama chêt tlat dân te an zir a, an hlawhtling hle.

Boruak lawng Gemini chu hetia han en thuak chuan a hmaa an boruak lawng, Mercury nên a inang hle nachungin a changkâng hle a. Mi pahnih thut theihnaa an siam *reentry module* chu chingalthlawrbûr ang deuh a ni a, a arh lai chu hawlhtlangin ft 7.5 a ni a, a hma lam chu



Gemini

zuih pheiin, a hmâwrah chuan boruak lawng dangte nêna an intawh theih nâna an awmna chin hriatna hmanrua (radar) leh vân sâng aṭanga an lo kîr leh lama hman tur parachute a awm bawk a. Mihring chuanna pindân hnung lamah chuan khâwl pawimawh chi hrang hrang a awm a. He pindan phei hi chu an lo kîr leh dawna thlawn tura ruahman a ni a. Gemini pum pui rih zawng chu ton 3.6 lai a ni a, a sei zawng pawh ft 18.3 lai a ni. Gemini kah chhuah nân hian Titan - 2 rocket an buatsaih bawk a.



Alexei Leonov

Chutia America-in Gemini a buatsaih tlut tlut lai chuan Russia chuan mi pathum chuan theihna boruak lawng Voskhod 1 chu puangzar lawk lovin October, 1964 chuan a thawn chhuak leh ta thut mai a. Thla lama

inelnaah pawh Russia chuan hma a hruai leh ngei dawn niin mi tam tak chuan an ring a. A kum leh March thlaah Voskhod 2 an kâp chhuak leh ta bawk a. Hemi tum hian mi pahnih an chuang a. A chuang zînga pakhat Alexei Leonov-a phei chu boruak lawng ata chhuakin, oxygen dâwta inthlungin, vân sâng boruakah chuan a kal ta mai a. Ti chuan, mihring zinga vân sâng boruaka kal hmasa ber a lo ni ta a ni.

Chuti anga harsatna nei miah lova a kal thei ta mai chu mi tam takin mak an ti hle. Hetia hlawhtlinna ropui tak an neih hnu hian harsatna mak takin a tlâkbuak thung. Leia an lo kîr leh dawnin, an chuanna khâwl chuan a thawh tur a thawk tha thei ta tlat lo mai a, an buai ta hle mai a. Ti chuan, an tlâkna tura an ruat lâwk chu km 1600 laia thêlhin, vur nâwi tam tak awm khawmna tuiah a tla ta a. Dârkâr rei tak chung vawt ti taka an awm hnuin an chhan chhuak thei ta hrâm a.

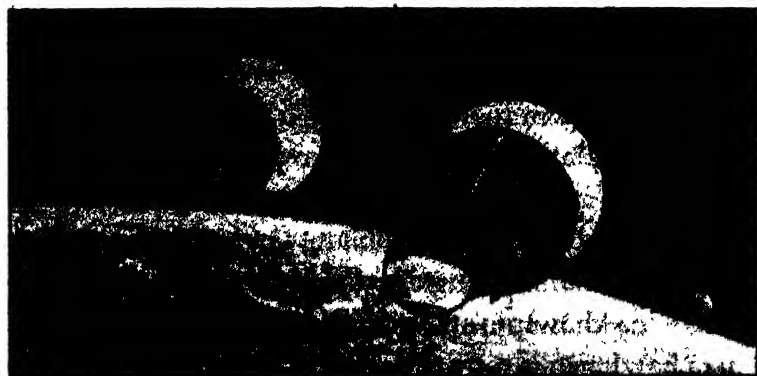
A tîrah chuan Voskhod siam dân hi hriat chian a ni lo va, America pheih chuan a bengkhawn hle a. Amaherawhchu, thil thar vak a lo ni lêm lo va, a hmaa an boruak lawng Vostok, tlêma tih danglam deuh mai a lo ni tih an hre ta a. Ti chuan, America pawhin rilru ngaihngam takin Gemini Project chu an chhonzawm ta zêl a. Gemini 4-a chuang James Mc Divitt-a leh Edward H. White-a te pheih chu ni 4 zet vân sângah han thlâwkin lei an hêl a. Hetia an thlawh lai hia. White-a chu boruak lawng ata chhuakin vân sâng boruakah chuan a kal ve ta a. Oxygen dâwta inthlungin, minute 21 chung zet boruak lawng pawna a awm hnuin boruak lawngah chuan a kîr leh a. Ti chuan, America mi vân sâng boruaka kal hmasa ber a lo ni ve ta a ni.

Gemini 4 hnuah hian L. Gordon Cooper-a leh Charles Conrad-ate chu Gemini 5 hmangin an thawh leh a. Anni pheih hi chuan an hmaa mi zawnzawngh khûmin wawi 120 zet vân sâng boruak atangin lei an hêl ta mai a. Cooper-a hi Mercury hmanga lo zin tawh kha a ni a, a zin hmasak

tuma a thil hmuhte Chiang leh zualin a han hmu a, tuifinriata lawng kal te, thlawhtheihna thlawkte pawh vân sâng atang chuan an thlîr a; chu bâkah lei lam thla wawi tam tak an la a. Ti chuan, hlawhtling takin an lo kîr leh ta a.

Vân sângah boruak lawng an intâwk

America chuan vân sâng a boruak lawng thawh chhohte sâng zâwka phur chho thei turin boruak lawng dang 'Agena' chu a siam a. Agena chu boruaka kah chhuah phawt a, chumi hnua Gemini kah chhuah ve leh a, Agena nêh chuan inzawmtîr a, Gemini chu Agena hmanga sâng leh zuala dah chhoh a tum a. Amaherawhchu, Agena kah chhuah a tum hmasak ber tum chuan a hlawhchham ta hlah a. Eng pawh nise, Agena aiah boruak lawng Gemini 7 a kâp chhuak ta thung a. Chumi hnu ni riatnaah chuan Gemini 6 chu Titan rocket hmanga kah chhuah tura tih a ni a. Kah chhuah peih diama an dah tawh hnua leh a chhunga chuang Schirra



Gemini 6 leh Gemini 7

leh Thomas P. Stafford-a pawh inring renga an awm tawh hnuin an chuanna khâwl chu a thi ta tlat mai a. Vânnethlâk takin rocket chu a puak hman lo hlauh va, thihna an pumpelh thei ta hrâm a nî. A hnu ni thumnaah Gemini 6 chu an kâp chhuak thei ta chauh va. Ti chuan, Gemini 6 chu Gemini 7 nen inhnaih takin an han thlâwk dun ta a. An inhnaih lai ber pheih chuan an inkâr metre khat emaw lek te a ni a. Chutia ni khat chhung an thlawh dun hnu chuan Gemini 6 chu a lo kîr leh ta a. Gemini 7 erawh chu a chhunga chuang Frank Borman-a leh James A. Lovell-a nêh ni 14 chhung zet vâh sângah thlâwkin vawi 206 lai lei an hêl hman a. Ti chuan, a hmaa mi zawng zawng khûmin vâh sâng boruaka châm rei ber an lo ni ta a.

Kum 1966 March thlaa Gemini 8 an kah chhuah chu Agena nena inzawm tura tih a ni leh a. Hemi tum hi chuan Agena pawh tluang taka kah chhuah a ni a. Gemini 8-ah chuan David Scott-a leh Neil A. Armstrong-a an chuang a. Vâh sângah chuan Armstrong-a chuan an chuanna boruak lawng hmâwr zuh lam chu zawi têa nawrin, Agena hmawra inzawmna tura an lo ruatsa nêh chuan insiktrin, a zawm thei ta a. Amaherawhchu, harsatna a lo thlang ta tlat mai! Chutia a zawm hnu lawk chuan Gemini 8-a vir ta vak mai a. Armstrong-a chuan an inzawmna chu phêlhin a theih ang tawkin thunun a han tum a tih a, harsa a ti ngang mai a. Chutih lai chuan leia a enkawlna khâwlpui atangin lei lama kîr vat tura hriattir a ni ta bawh nêh, a rang thei ang berin lei lamah an lo kîr leh ta a. Tiêma tiêmah an che sual teuh hle mai.

America chuan Gemini 9 kahchhuaha, Agena hman bawka vân sâng zâwka dah chhoh a tum leh a. Amaherawhchu, hemi tum pawh hian thil khirhkhân tak mai a lo thleng leh tlat mai. Agena an kah chhuah chu, a tuamtu kâwr a inphêlh kim thei ta tlat lo mai a. A hmutu ngei, Gemini 9 a chuang Tom Stafford-a sawi dânin, awlê thinrim ang maiin a âng huau ringawt ta mai a. Ti chuan, Gemini 9 chuan zawm tur a neih tâk lovah chuan a chhunga chuang Eugene A. Cernan-a chuan vân sâng boruaka kalte a zir ta zâwk a.



Edwin E. Aldrin

Tum thum lai Gemini boruak lawngte hi tih an ni leh a. Gemini 10-a chuang John W. Young-a chuan an chuanna boruak lawng chu Agena-a zawmin Agena chuan sâng takah a hruai chho thei ta a. A chuanpui Michael Collins-a pawh boruak lawng pâwnah chhuakin a

khâwl a va enfiah a. Gemini 11-a chuangte pheih chu km 1370 laia sângah Agena hian a hruai chho a. Gemini 12-a chuang Edwin E. Aldrin-a pawh harsatna nei miah lovin vân sâng boruakah kein a kal thei ta bawk a. Gemini project chu eng eng emaw harsatna awm mah se, a hlawhtling hle.

Thla lam enthlithlai hna an thawk tan

Boruak lawng hmanga vân sâng boruaka nunchan an zir chhoh zêl laiin, thla chanchin hre chiang tur leh enthlithlai turin boruak lawng 'Ranger' pathum lai kum 1964 leh 1965 chhungin America chuan a thawn bawk a. Ranger pathumte hian thla leilung thlâ an han la a, lei atanga entlang tha bera en aia a lêt tam taka chiang zâwk thlalâk tam tak an rawn thawn a. Thla leilung mâm lai ber ni âwma langahte pawh lung tam tak a kat nuk mai a ni tihte an hre thei ta a.

Kum 1966, February thla chuan Russia enthlithlaitu boruak lawng Luna 9 chu Thlaa phaizawl hniam lai Oceanus Procellarum hmunah an han tumtir ta hial a. A tumna bul vêl thlate lain leiah a rawn thawn a. Thlalâk atanga en chuan thla leilung chu a mu deuh hruih hian a lang a. Chu bâkah lung lian vak lo hi hmun tinah a awm nual bawk a. Thenkhatin thla leilung pawnlâng chu vaivut nêem chhah tak nia an lo ngaih thin chu a dik lo a ni tih a chiang ta hle.

America pawhin Apollo boruak lawngte tumna hmun tur endik turin enthlithlaitu (Surveyor) tum sarih zet a thawh leh a. Chûng zînga pangate chu han tumin, an thawh tur ang tha takin an han thawk thei a. Thla chu mihring han tum nân leh vah vêl nân a him tâwk a ni, tih chiang takin an rawn hrilh thei ta a. Hmanrua an kente chuan thla leilung awmzia chiang tâwk takin an rawn thawh thla a. Tha leilung chu a tângpuiin tlang kângin

lei chhunggrila mi a rawn vawrh chhuah ang hi niin a lang a.

Surveyor-ho an thawm lai vêk hian thla enthlithlai tur bawkin America chuan thla hêltu (Lunar Orbiter) panga a thawm a. Lunar Orbiter-ho hian thla hêlin, thla thlâ tam tak an han la a. An thlalâk rawn thawnte chu hmun rualrem leh him lai thlan nân a tangkai hle a, thla chanchin hrim hrim pawh a hma aia chiang zâwkin an hre thei ta a.

America-in vânduaina a tâwk

Chutia America-in thlaa inkah kai tuma theihpatâwp chhuaha tan a lâk lai chuan rin loh takin vânduaina rapthlak tak a lo thleng ta tlat mai! Mihring chuanna boruak lawng Apollo 1 chu kum 1967, January ni 27-a an enchhin laiin, a chhunga electric hrui zamah dik lohna a awm avangin a kâng ta hlauh mai a. Chuti chuan, a chhunga chuang mi pathum Virgil Grisson-a te, Edward White-a te leh Roger B. Chaffe-a te chu an kâng hlum ta dêr mai a. He vânduaina avang hian thla lam programme pawh thla sâwm leh pariat zetin a tlai phah ta a; President Kennedy-a'n kum 1970 hma ngeia thlaa mihring thawm an tum thu a lo puan lâwk pawh a hlawhtlin loh phah a hlauhawm ta hle a. Amaherawhchu, he vânduaina rapthlâk tak hian rilru tina hle mah se, kawng leh lamah chuan fimkhur zâwkna leh hmasâwnna ropui tak a rawn thlentir ta thung a. A hnua boruak lawng an siam leh reng rengin an fimkhur lehzuat a, boruak lawng chhungah thil

kâng thei chi engmah hman an duh ta lo va. Chu bâkah, eng emaw rîkrum thila a chhunga chuangte tlân chhuah theihna tur an siam ta zêl a.

Russia boruak lawng 'Soyuz'

Hetia America-in vânduaina a tawh lai leh boruak lawng tha zâwk siam hna a thawh mêk lai hian Russia chuan mihring chuan theihna boruak lawng thar Soyuz a lo siam ve hman dêr tawh a. Amaherawhchu, mak tak maiin Russia pawhin vânduaina rapthlâk tak a tâwk ve hlauh mai.



Soyuz

Soyuz boruak lawng hian pindân pathum a nei a. Vân sâng boruaka boruak lawng dangte nêna inzawm thei tura duan a ni a. America boruak lawng Gemini ai kha chuan a lian

deuh nain Apollo boruak lawngte chu khan lo tak a ni thung. A hma lam chu a mûm a, chumi chhung chu a chhunga chuangten lei an hêl laia enchhinna hna an thawhna hmun tur a ni a.

A pindan laita, mihring chuanna tur chu silai mu ang deuh hlek hi a ni a, a sei zâwng pawh ft.7.2 lai a tling a. Mihring chuanna hnungah hian boruak, thianghlim

(oxygen) dahkhâwl na te, ni êng chakna hmanga kawlphe tha siamna khâwl te, leh thil dang eng eng emaw a awm a. A pum puia a rih zâwng chu ton 6.7 lai a ni. Vên sâng boruak atanga a lo kîr dawn hunah a hma lam pindân leh a hnunglam pindân hi an thlawn ang a, a pindân laita, mihring chuanna chauh hi leiah a lo kîr leh dawn a ni.

A tîr takah chuan mi pathum chuang tura tih a ni nain fimkhur thilah mi pahnih chuang tura tih a ni leh a. An kah chhuah dawn tēpah pheh chuan mi pakhat chauh chuang tura tih a ni leh ta a. Ti chuan, a hma kum hnih leh a chanve raltaa Voskhod 1-a chuangte zinga an hotupa Vladmir Komarov-a chauh chu an chuantîr ta a. Soyuz 1 chhiatna chhan hi bulbâl taka hriat a ni lo va. Ngaih dân tlângpuiah chuan, Komarov-a hian vên sâng atanga lei a hêl laiin, boruak lawng khan a kawng zawhah harsatna a neih avangin, ni khat hnuah chuan Komarov-a chu lei lamah a lo kîr ta thut a, vânduaithlak takin a parachute a inherh avangin a parh tha thei ta lo va. Ti chuan, boruak lawng chu a chhunga chuang nen chuan leiah a keh sawm ta a ni. Komarov-a vânduaina hian Russia vên lam programme pawh a tisukuk ve hle a, boruak lawng siamtute pawh an hrilhai hle.

Soyuz 1 an kah chhuah hnu hian Soyuz 2 leh Soyuz 3 an kâp chhuak leh a. Soyuz 2-ah hian mihring an chuang lo va, Soyuz 3-ah hian mi pakhat a chuang a. Soyuz 3 chuan Soyuz 2 a han tâwk a; mahse an inzawm chiah lo va. Hemi hnuah hian Soyuz 4 leh Soyuz 5, mihring chuanna ve vete chu vên sângah intâwkin an inzawm ta

a. A chhunga chuangte pawh an intlawh tawn thei ta a. Soyuz 6, Soyuz 7 leh Soyuz 8 te kâp chhuak lehin, heng boruak lawng pathumte hian a huhovin lei an hêl a. Hemi hnua an kah chhuah Soyuz 9 phei chuan ni 17 chhung zet vân sâng atangin lei a hêl a. Soyuz project hi, a tîrah vânduaina rapthlâk tak awm mah se a hlawhtling hle. Amaherawhchu, America-in, thla lama hmasâwnna ropui tak a neih chuan a khûm tak êm avangin a lâr tur angin a lâr ta vak lo va.

Apollo enchhinna hlauhthâwnawm

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Apollo boruak lawng khalhtute chuanna pindan Command module chu Gemini ang bawkin chingalthlawrbûr ang deuh a ni a. A lian lai ber chu, a laia hawlhtlangin ft 12.7 a ni a, a sei zâwng chu ft 12.3 a ni. Chumi hma lam chu zuih pheiin, a lai kua atang chuan a khalhtute chu chhuakin, boruak lawng dangah an pakai thei a. Command module hnung lam pindân chu Service module a ni a, a laia hawlhtlangin ft 24.4 a ni thung. Hemi chhungah hian oxygen bâwm te, tui te, tuialhthei bûr leh thlaa hêl nân leh lo kîr lehna tur khâwl SPS engine a awm a. A pumpuia a rih zâwng chu ton 29 lai a tling a. Tin, thlaa han tumna tur atân bîk boruak lawng hnung lamah hian maimawm ang tak, ke pali nei Lunar module an tih chu a awm baw k a.

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ni 21, 1968 chuan kah chhuah a ni leh a. Hemi tum hian mi pathum an chuang a. An rocket hman hi chhâwng thum a ni a. A chhâwng khatna leh chhâwng hnihna chuan lei hêl thei khawpa sângah a han vawrh chho va. Chutia lei a hêl hnu chuan Apollo 8 chu a chhâwng thumna chuan thla lam parin a nawr kal ta a. Thla chu km. 110 vêl atangin a han hêl ta pap pap a. Ti chuan, a chhunga chuang Frank Borman-a te, James Lovell-a leh William A. Anders-a te chu mihring zînga thla hêl hmasa ber an ni ta a. Thla an hêl chhung hian a thlâ vawi tam tak an la a. A tum theih huna tumna tur hmun thate ngun takin an zawng a. Vawi sâwm zet thla an hêl hnu chuan SPS engine hmang chuan lei lamah an lo kîr leh ta a. Enchhinna an han neih reng reng hi hetia han ngaihtuah thuak ai hian a hlauhawmin fimkhur a ngai êm êm a, a khâwlah that lohna eng emaw lo awm hlauhvin, lo kîr thei ta lo mai se, hêlai hmunah hian an thi mai dawn a ni. Vânnethlâk takin engmah harsatna nei lovin lei lamah an lo kîr leh ta a.

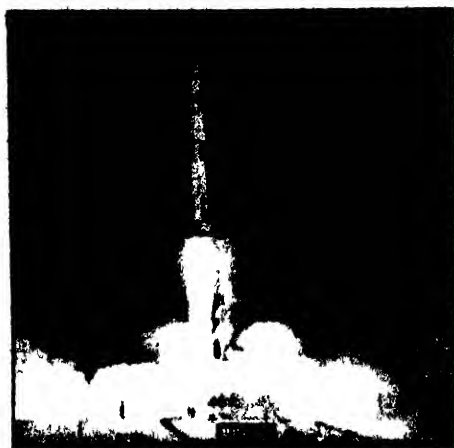
Thil harsa tak leh huphurhawm tak la awm chu Lunar module enchhin a ni a. Kan sawi tawh angin Lunar module hi thlaa tumna tak tak tur a ni a. Ti chuan Apollo 9 chu kah chhuah a lo ni leh ta a. Lunar module chu Saturn V rocket chhâwng thumnaah dah a ni a. Thla an hêl laiin Lunar module chu a awmna atang chuan nawr chhuakin, rocket hmâwra Apollo boruak lawng nêh chuan an zawm ta a. An inzawm fel hnu hian rocket chhâwng thumna chu boruakah an kalsan a, boruak lawnga chuanga zînga pahnih chu boruak lawng leh

lunar module inzawmna kuaah chuan vâk pheiin, lunar module-ah chuan an insawn ta a. Lunar module chu boruak lawngpui atang chuan thlâwk chhuakin, rei vak lo an thang hnuah a lo kîr leh a, boruak lawngpui nêen chuan an zawm leh ta a. Ti chuan, lunar module enchhinna hna pawh thluang takin an zo ta a. Enchhinna tâwpna ber atân Apollo 10 an kâp chhuak leh a. Hei hian a hmaa kah chhuah tawhte tih hnu a tih leh vek bâkah thil tûl dang eng eng emaw a ti leh a, hlawhtling takin leiah a lo kîr leh a. Ti chuan, hmabâk awm chhun chu a taka thlaa han tûm chiah a ni ta a.

Thlaah an lâwn ta

Lei lam ngaihtuahna atang chuan thlaah an lawn, tih emaw thlaah an inkâp kai, tih te hi sawi dân awm tak a ni a, kan sawi dân lâw ber pawh a ni âwm e. Amaherawhchu, a tak takah chuan boruak lawngte hian lei hîpna chak tak thlawh pêla, thla hîpna huam chhung boruak an thlen chinah chuan thla chu an hnua lama awm ang a lo ni ve leh thung a; chu vangin vân sâng atanga leia an lo tûm ang tho hian thlaah an tûm dawn a ni. Amaherawhchu a hmaa kan sawi tawh angin mîhring ngei thlaa han tûm tur meuh chuan a awl-ai lo hle.

Eng pawh ni se, hun rei tak ata tawh mîhringte'n kan lo suangtuah ~~thin leh thawnthu~~ ^{thin leh thawnthu} leh mumang chauhva kan lo hmuh ~~thin chu~~ ^{thin chu} a takin a lo thleng dawn ta le. Kum 1969 July ni 16 a lo ni a. Saturn V rocket, Apollo 11 phurtu chu Cape Canaveral atang chuan kah chhuah a ni ta a. He



boruak lawngah hian Gemini boruak lawng hmanga lo inzir thiam tawh Neil Armstrong-a te, Machael Collins-a te leh Edwin Aldrin-a (Bush Aldrin-a) te an chuang a. A hmaa Apollo boruak lawng dangte' n enchhinna an lo neih tawh ang zêlin

thil tluang takin a kal zêl a. Thla lam pana thlâwk zêlin, thla an han hêl ta pap pap a. Hetih lai hian lei lama a khâwl pui lo enkawltute bâkah khawvêl mipuiin beiseina sâng tak nêh, hlauthâwng tak bawh siin an ngaichâng thup mai bawh a.



Armstrong-a leh Aldrin-a chu an chuanna boruak lawngpui atang chuan thlaa an tumna tur Lunar module,

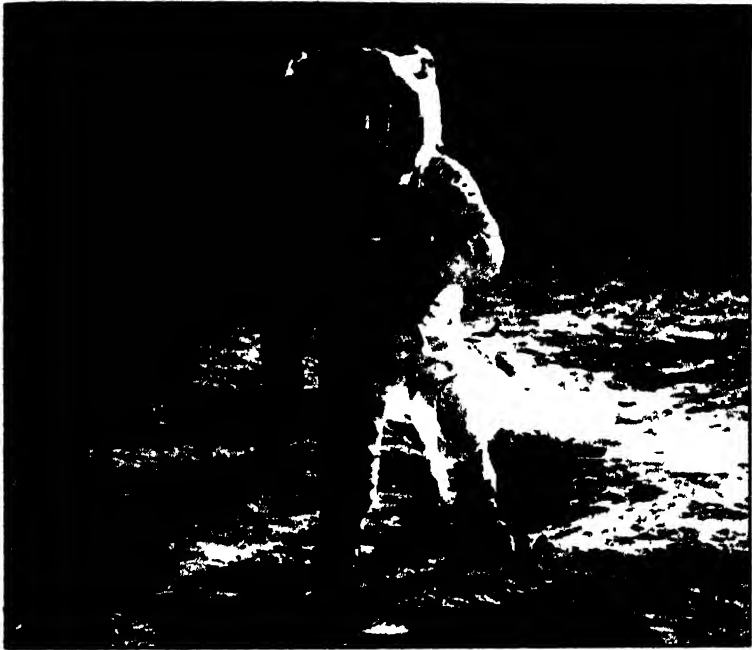
a hming lema Eagle tia an kohah chuan an insawn ta a. Ti chuan, an thianpa Collins-a chuan boruak lawngpui chu lo khalhin, thla a lo hêl reng a. Armstrong-a leh Aldrin-a te chu Lunar module hmang chuan an inkâp chhuak ta a. Chutia an tumna hmun tur Sea of Tranquility phaizâwl an pan a, an tum dawn têp chuan Aldrin-a chuan, thli leh bawlhhlawh nawi lêng vêlin an chuanna a bawh thu lei lamah a thaw n a. Chumi hnu lawk chuan Armstrong-a chuan, "Kan tum ta e," tiin lei lamah a hrilh ta a. Hetih lai hun hi July ni 20 zan dar 10 leh minute 56 (GMT) a ni a. Lei lama a khâwlpui lo enkawltute leh beiseina sâng tak leh hlauhthaw nna nena lo thlirtute pawh an thaw ta huai a. Armstrong-a leh Aldrin-a chu phûr takin, thla leilung rap tur chuan an inbuatsaih ta sawk sawk a. Armstrong-a chu chhuak hmasa tura tih a nih angin an chuanna atang chuan chhuakin, leilâwnah chuan a chhuk ta a. Thla



leilung chu rapin, "Kha mi pakhat tâna pen zim tê kha, mihringte tân sâng taka zuan dawrhna a ni," a'n ti ta mai

chu le New York leh London-a puanzâr lian puia a thla lo thlirtu sâng tam tak lâwm lutuk chuan kut an bêng a, a then an au va, a then an zuang a; T.V. en pha ve lo ramte pawh he chanchin hian a dêng chhuak rang hle. Keini ram kilkhâwr berah pawh a hlimchhâwn kha chuan titi dang a leng meuh lo a nih kha.

Aldrin-a pawh a chuanna atanga lo chhuakin thla leilung chu a rap ve ta a. An hmanraw kente an la chhuak a, lei leh thla inkâr hlat zâwn dik tak hriat tumin an teh a. Thla leilung chu a lo nâl deuh hlek a; mahse harsatna nei lovin an kal kual thei a. Armstrong-a chu dârkâr hnih leh minute sâwm leh panga a vâk kual a, Aldrin-a pawhin tlêma rei lo deuh kal kual nan hun a hmang a. Lirnging tehna khâwl an kente chuan lirngin dânte an zir a. An tumna hmunah chuan thîr phêka thil inziak an hnutchhiah a. Chutah chuan ti hian a inziak a: *Here men from planet earth first set foot upon the moon. July 1969 A.D We came in peace for all mankind.* Mizo jawng chuan 'Helai hi lei mihringte'n thla leilung kan rahna hmasa ber a ni. July 1969 AD. Mihringte tan remna nena lo kal kan ni' tihna a ni. Hemi inziak hnuaiah hian Armstrong-a leh a thiante pahnih hming leh hetih laia America President Richard Nixon-a hming a inziak bawk a. An tum atanga dârkâr 22 thêh an thang hnuin an tumna Eagle bung chunglam hmangin thla atangachuan an inkâp chhuak a. Command module-a an mahni lo nghaktu Collins-a chu an han fin leh ta a. Thla leilung pawh kg 20 lai an hawn a. Ti chuan, hlawhtling takin lei lamah an lo kîr leh ta a ni.



Neil Amstrong

Russia boruak lawngte pawhin thla an thleng

Apollo 11 tum ni tho hian Russia thla enthlithlaitu



Lunokhod

boruak lawng, Luna 15 chuan thla a han thleng ve chiah a; a ma her a w h chu, vânduaithlâk takin a keh chhe hlah mai a. Russia chuan a kum lehah Luna 16 a tir leh a. Hei hian thla

leilung pāwnlāng gram 100 lai han rûtin, leiah him takin a rawn hawn a. Kum 1970 November ni 19 khan Luna 17 an tîr leh a. Chu chuan tawlaillir ke pariat nei, thla leilung zirna hmanraw keng a phur a. He tawlaillir hi a hmingah Lunokhod an vuah a. Kum 1973-ah hetiang chi bawh, tîema tihdanglam an thawm leh bawh a. Heng tawlaillirte hi an vâk kual a. TV thlâlâkna an ken chuan thla leilung thlate an la a; chu chu leiah an lo thawm a.

Apollo boruak lawng dang

Kum 1969, November ni 12 khan Apollo 12 pawhin thla a han thleng leh a. Hemi tum hian Charles Conrad-a leh Alan L. Bean-a ten thla leilung an han rap a. An tumna hmun, hi a hma kum hnih leh a chanvea Surveyor 3 lo tum tawhna hmun Oceanus Procellarum bul lawk kha a ni nghe nghe. Thla leilung kg. 34 zet an rawn hawn a.

Kum 1970, April thlaa an kah chhuah Apollo 13-a chuang te, James Lovell-a, John Swigert-a leh Fred Haise-a chuan harsatna namên lo an tâwk hlauh mai a. Thla an pan mêk laiin a khâwlpui, Service module-a boruak thianghlim dah khâwlina bawm chu a puak keh ta hlauh mai a. Thi ngei tura rin an nih laiin, vanneihthlâk takin thlaa an tumna tur Lunar module chu oxygen leh kawlphepha petu atân an hmang thei ta hrâm a. Ti chuan, thlaa tum ta lo chuan a rang a rangin lei him an lo pan dîng ta nal nal a, hrehawm nasa tak tuarin leiah an lo kir leh thei hrâm a.

Apollo 13 hnua hian Apollo 14, Apollo 15, Apollo 16 leh Apollo 17 te thawm an ni leh a. Mi pariat laiin thla leilung

an han rap leh a. Kum 1972, December ni 7-a Apollo 17 an kah chhuah chu thlaa zin tâwpna a lo ni ta rih a. Hemi tum hian Eugene Cernan-a, Ronal Evans-a, leh Harrison Schmitt-a te an chuang a. Cernan-a leh Schmitt-a te hian thla leilung an han rap a. Dârkâr 74 leh minute 59 lai an cham hnuah thla leilung kg. 113.6 lai nen hlawhtling takin an lo kîr leh a. Ti chuan, Apollo project chu a lo tâwp ta a ni.

Apollo project hlawhtlinna avangin America rilru nâ pawh hnai lâk ang huaiin a dam ta. Amaherawhchu, Russia-in mihring tel miah lova thla leilung a han la thei hi hlawhtlinna ropui tak chu a ni ve tho. Hetiang hmang bawka mihringte zin phâk loh planet dangte leilung lâk theih a la nih ngei beisei pha tân chuan han ngaihnêp chi a ni lo rêng a ni.

Apollo project chhung-khan America chuan thla



Thla leilung

leilung kg. 365 zet an hawn a. Heng atanga an thil hriat tam tak chu la chhui chian ngai a ni nain, thil chiang tak pakhat chu, thla khi kan awmna lei leh planet dangte ang bawkin kum

maktaduai 4600 ral taa insiam a ni tih an hre thei a. Thla lo insiam dân chungchanga ngaih dân tlang lâwn berah chuan, a tîrah lei hi tun aia lian deuh hi a ni a, chu chu a lo keh a, chuta tâng chuan thla hi a lo insiam ta niin an ngai. Tin, kum maktaduai 3700 ralta vêlah khan tlangkâng nasa tak a awm thin a, kum maktaduai 3000 ralta bâwr vêl khan a reh thawkhat ta niin an ngai bawk.

Thlaah awmhmun khuar an tum

Kum 1972 December thlaa America mi Eugene Cernan-a leh Harrison Schmith-a te Apollo 17 hmanga han zin kha thlaa mihring an zin hnuhnung ber a ni ta rih a. A reh ta vang vang a, kum 1984 October ni 30 khân NASA-a an hotu James Beggs-a chuan kum zabi 21-na tîr lamah chuan thlaah kîr lehin, thla leilung hausakna hai chhuakin, vân lam chanchin zir chhoh zêl nân awm hmun khuar an tum thu a puang a. Kum 2004 khân, U S President George W. Bush-a chuan kum 2020 vêla thlaah *lunar base* nei tûra ruahmanna an siam thu a sawi bawk. Japan leh India pawhin kum 2030 vêlah chuan thlaah awm hmun khuar an tum a; chutiang bawkin Russia pawhin kum 2025 vêlah chuan thlaah mihring thawn a tum bawk.

Hetih lai hian, kum 2008 October ni 22-a India boruak lawng kah chhuah Chandrayaan-1 aţanga an zirnaah September ni 24, 2009 khan NASA chuan thlaah tui a awm ngei a ni tih a puang ta ta tlat mai! Kum 2010 March thlaah pheichuan a hmar tâwpah vûr tam tak a awm ni tih an hmu chhuak ta bawk. Nakin lawkah chuan thla khi an la dai dar hle dâwn niin a lang ta. Ei rêlna atân leh khâwl hmanga hna thawhna atân ni êng chakna an hmang ang a, tui leh vûr atângin boruak thianghlim 'oxygen' pawh an siam thei mai dâwn a ni. Thlaa tui hi ei leh in atân bâkah huan thlai chawm nân pawh an hmang thei ang. Thla khian tuamtu boruak 'atmosphere' a neih ve loh avângin vân pawh a thiang bik hle a; chu chu remchânga hmangin, entlang tha tak takte bunin, vân lam chanchin an la zir ngei ang.

5

PLANET CHANCHIN AN ZIR

Ni hêltu planet-te hi pariat an ni a; planet pakuana ni thin Pluto kha chu planet zînga chhiar tel a ni ta lo va. Planet zînga kan thenawm hnai zualte chu Mercury, Venus, Mars, Jupiter leh Saturn te an ni a.



Ni hêltu planet-te

An ên ve tho avangin arsi dangte ang tho niah mi tam tak chuan an lo ngai thin a, kei ni Mizo pi pute pawhin arsia an lo ngai ve tho mai. Amaherawhchu, arsi dangte ang lo taka an awmna a insawn zung zung thin avangin arsi vak vêlho (wanderers) tiin an lo sawi thin a. Tûnah phehi chuan mahnîa ênna nei lo, kan awmna lei

ang thova nî hêltute an nih dân Chiang takin kan hre ta a. Mit lâwna awlsam taka hmuh theih an nih avangin hmakhawsâng atangin an lo zir tawh thin a; amaherawhchu, kan lei tuamtu boruak avang te, anmahni tuamtu boruak leh chhum avangtein duh ang takin hmuh chian theih an ni lo va. Ti chuan, vân lam hun kan lo kai hnu chuan boruak lawng hmangin Chiang zâwkin an chanchin kan hriat belh thei ta zêl a.

Venus - planet zînga kan lei hnaih ber

Planet-te zînga kan lei hnaih ber chu Venus (Chawngmawii) a ni a. kan awmna lei tiat vêt niin, nî atanga chhiar chuan planet pahniina a ni a. He planet! chhûm chhah takin a tuam reng avangin a chanchin kîmchang hriat a hre hie. Thenkhat chuan tûn hma kum tam a. Hma kan lei ang kha niin ransa mak leh



Venus leh Mariner 2

tihbaiawm pui pui 'dinosours' ang chite kha la awmin an ring hial a. Thenkhat chuan, soda tuiin hmun tam tak chu a khuh niin an ring bawk. Thenkhat ve thung chuan, tui awm lohna hmun ro leh vaivut tamna niin an ring.

Kum 1962, August thlaa America-in mihring chuan lohna boruak lawng Mariner 2 a kah chhuah chuan, hemi kum vêk December thla ni 14 hian Venus chu km. 35000 vêl leka hnaiah a han thlawh pêl thuak a. Mariner 2 hlawhtling taka kah chhuah a ni hi America tân a hlu hle a, planet-te zirna kawnga Russia a lehpelh tâna angah pawh a ngaih theih a. He boruak lawng hian thlalâkna a ken loh avang leh tum tura tih a nih loh avangin thil tam tak a han chhui lo va; a thil hriat chhun erawh a pawimawh hle. He boruak lawng atang hian Venus chu tân hmaa an lo rin aiin a sâ hle a, thil nung awmna chi a ni lo va, a hîpna a chak lo hle a ni, tih leh a vir muang hle a ni, tih an hre thei ta a. A hnua boruak lawng dangte atanga kan hriat dânin, nî vawi khat a hêl chhuah chhungin vawi khat pawh a 'axis'-ah a vir chhuak hman lo, a lo ni reng mai a. Chumi awmzia chu Venus-ah chuan kum khat aiin ni khat a rei a nih chu! Chu chauh ni lovin planet dangte ang lo takin khaw chhak lam atangin khaw thlang lamah a vir tlat bawk. Chumi awmzia chu khaw thlang lamah ni a chhuak heh mai a nih chu!

Russia pawhin Venus chanchin zir turin boruak lawng 'Venera' eng emaw zât a tir chhuak ve bawk a. Chung zîngah chuan kum 1967 June ni 12-a a thawn chhuah Venera 4 chuan October ni 18-ah a tum ram a han

thleng a, lei lamah venus chanchin tam tak a rawn hrih thei ta a. Boruak lawng chuan Venus tuamtu boruakah parachute hmangin thil zirna khâwl a thlâk thla a. He khâwl hian boruak chi khat Carbon dioxide a tamzia leh boruak nemna chu kan lei tuamtu boruak nemna aia a nasatzia a han chhui chhuak a. Venus-ah tui a awm loh dân leh thil nung han awm theihna chi a nih lohzia a han chhui chhuak a. Vânduaithlâk takin Venus a thlen hmian a keh sawm ta hlauh va, chanchin dang a rawn thawm thei ta lo va. Eng pawh ni se Venera 4 hlawhtlinna hi Russia tân mai ni lovin khawvêl tân thil chhinchhiah tlak tak a ni.

Kum 1969, May thla khan boruak lawng pahnih Venera 5 leh Venera 6 pawhin Venus tuamtu boruak chu a han thleng ve leh a; amaherawhchu, minute 50 chhung lekin hna thawk thei lovin a keh chhe ve leh a.

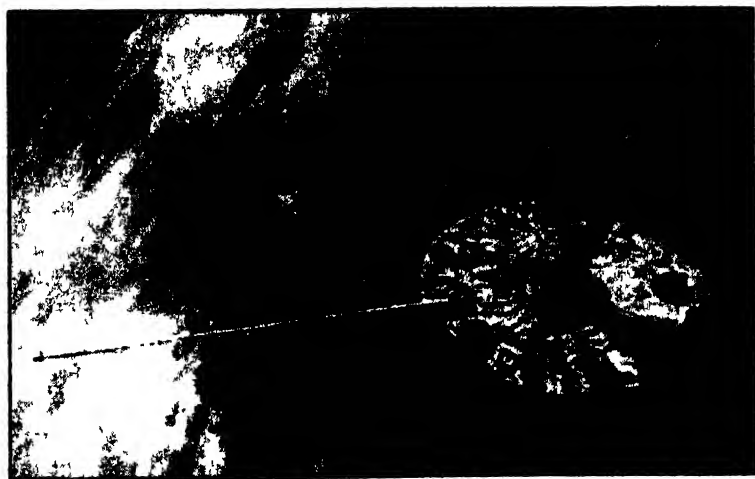
Vânneihthlâk takin, kum 1970, December ni 15-a Russia boruak lawng Venera 7 chuan Venus han thlengin a han tum thei ta hlauh mai a, thil tam tak a han zir thei ta a ni. A khâwl chuan Venus tuamtu boruak zaa sawmkua (90%) zet chu Carbon dioxide a ni tih leh a tuamtu boruak nemna (pressure) chu kan lei tuamtu boruakin a nemna alin a lêt sawmkua laiin a nasa zawk a ni tih a han hre Chiang ta a. A lum zâwng pawh 475°C lai a ni tih a han hre ta a ni.

Venera 7 hi kan lei lam chhawnah a han tum a. Ni lam chhawn a nih loh avangin a thim lam emaw zan lam

emaw kan ti thei ang. Kum 1972, July thla khan Russia boruak lawng bawk Venera 8 chu a chhun lam, nî lam chhawnah a han tum ta thung a. Chu chuan chhûn leh zân lum zâwng a danglam vak loh tih a han hmu chhuak a. Hetia chhûn leh zân boruak a danglam vak lohna chhan hi a tuamtu boruak chhah leh bit vang niin an ngai ber.

Kum 1975, October thlaa Venera 9 leh Venera 10 an thawn lehte chuan thlalâkna tha tak an keng ta a. Thlalâk atang chuan lung rualrem lo leh ki têng tûng tam tak a leilung pâwnlângahte chuan a awm khup mai a nî tih pawh an hre thei ta a. Chung lungte chu he leia tlangkângin a vawrh chhuahte nen hian an inang thawkhat hle a.

Hetia Russia-in Venus leilung awmdân a zir lai hian America chuan a tuamtu boruak leh chhum awmdân a lo zir ve reng bawk a. Kum 1974 February thla khan America



Pioneer - 2

boruak lawng Mariner 10 chuan chhum thlâ han lain chhum kal dân te a han zir a, ni li chhungin chhûm chuan Venus chu an hêl chhuak hman a ni tih an hre thei ta a. Chhumah te chuan thil nâwi tam tak a awm a ni tih pawh thlalâk a tang chuan an hre thei ta baw k a.

Kum 1978, December thla khan America boruak lawng Pioneer - 2 chuan tui thûr chi khat, sulphuric acid tam tak Venus tuamtu chhûmah chuan a awm a ni tih a han hmu chhuak baw k. Ti chuan, boruak lawng an thawnte avangin Venus chanchin pawh a tlângpui chuan kan hre thei ta.

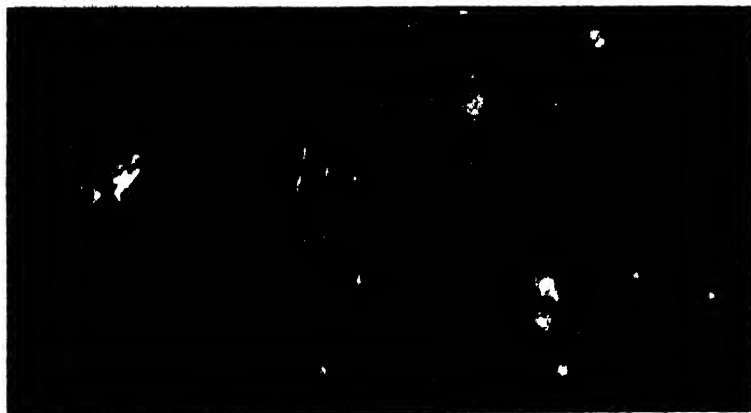
Kum 1990 May ni 4 khan America chuan Venus baw k zir turin boruak lawng Magellan a kâp chhuak a. He boruak lawng hian August ni 10-ah a tum ram a han thleng a. Radar thlalâkna hmangin Venus leilung awmdân a han zir a. Lei ang tiat vêl a ni nain kan lei anga leilung che vêl a awm vak lo va, tui a awm loh avangin leilung pawnlâng luangral ang chi pawh hmuh tur a awm lo va, a leilung pawnlâng sat zâwn g hi 475°C a ni tih kan hlat belh a.

Mercury - Planet zînga Ni hnaih ber

Ni hnaih zînga ni hnaih ber chu Mercury a ni a. Ni hnaih em avangin hmuh pawh a har hle. Kum 1960 bawr vêl radar hmangin an zir dânin kan lei vawi 59 vir chhungin vawî hman a ve chhuak ve hman hrâm a; ni vawi hman a hêl chhuah chhungin vawi thum a vir hman chia h a ni. Chumi awmzia chu kum hnih chhungin ni thum chia h

a awm a nih chu! Entlang tha tak nena an lo hmuh thin dânin Mercury hi thla nen a inang hle a ni âwm e.

Kum 1974 khan America boruak lawng Mariner 10 chuan hnai tê atangin a thlâ a han la a. A thlalâk chu thla nen a inangin thla leilung pâwnlâng ang maiin a khuar ve chuk mai. A leilung pâwnlânga awlsam taka han hmuh mai theih leh rilru la pêng hmasatu chu phaizâwl bial kulh mai, Caloris Basin an tih chu a ni a. He phaizâwl hi a laia tehin km. 1400 lai a tling zu nia! A lan dânah tlangkâng avanga lo insiam ni ngei tur a ni. Mercury hi planet dangte nena khaikhin chuan a tê bîk hle nain a muk êm êm a, a leilung chhungril tam zawk phei chu thîr hlâwm muk tak niin an ring.



Mariner - 10 leh Mercury

Kum 2004 August ni 3 khan NASA chuan boruak lawng Messenger chu Mercury zir turin a kâp chhuak a. Kum ruk chuang a thlawh hnuin kum 2011 March ni 18-

ah a tum ram a han thleng thei a. Meesenger hian km 200 atanga km 15000 vèl atangin Mercury hi a hêl a, a leilung chanchin leh a hîpna te leh a leilunga bâwihlo awm te a zir a. Mercury leilungah hian potassium a tam a ni tih pawh kan hre thei ta a, a lum zâwng pawh 185 atanga 427 Celcius a ni tih kan hre thei ta bawk.

Mars-ah thil nung an awm em?

Ni hêltute zînga nî hnaih lam atanga chhiara palina chu Mars (Sikeisen) a ni a; kan lei dawt chiaah nî a hêl ve a. Kan lei khing phêl tiat niin, thla tê reuh tê tê pahni Phobos leh Deimos a nei a. Planet zînga kan lei aia nî hnaihte - Mercury leh Venus-te chu an sât êm avangin thil nung an awm thei ang tih rin chi a ni lo va. Amaherawhchu, kan lei dawt chiaha nî hêltu, Mars hi chu unawnnu ih leh a tak takah pawh thil nung awm vea rinna nghet tak a lo awm tawh thin a. Chu vangin, planet dang zawng aia chanchin hi Chiang zawka hriat a châkawmin, planet zîngah chuan van lam chanchin zirmitte rilru la bertu a ni a.

Entlang tha tak nena en chuan Mars khi kan awmna lei ang tak mai a ni a. Tuamtu boruak pawh pan tê a nei ve a. A tuamtu boruakah chuan chhînte pawh a insi ve thin. Kan lei ang bawkin a chhim tâwp leh hmar tâwpah vur tlâng lian tak tak a awm ve bawk. Thlaler hmun ro sen huam mai bul vèla thil dum inphan duar mai, a châng rawng danglam thinte chu hnim hring an ni ngei ang, tih rin loh rual a ni lo. Thenkhat chuan tui

lākna kawng ang takte pawh an hmu a. Hêlai hmuna chêngte hian vur tlâng lian pui pui atanga lui lo luang chu a kawngte siamin, an thlai chāwm nân an hmang a ni ang em, tih te pawh a ngaihtuah theih rum rum mai.



Mariner - 4 leh Mars(Sikeisen)

Kum 1965 khan America boruak lawng Mariner 4 chuan hnai tē atāngin thlā a han la thei ta hlauh mai a. Chu chuan hun rei fe ata tawh mihring awm ve ngeia beiseina nghet tak chu a tihniām ta tlat mai. Chuti chung pawhin hnim hring emaw, lungsam emaw tal chu a awm ngei an la beisei viau tho va. Eng pawh ni sela, tui kawng ni āwm taka lang thinte kha tui kawng ni lovin tēk (meteorites) tlain a den avanga khwar sei tak tak lo insiam a ni tih an hre thei ta a.

Mariner 4 hian a tuamtu boruak chu kan lei tuamtu boruak aiin a lêt zain a muk lo zawk a, a pâwnlâng boruakin a nemna pawh kan lei pâwnlâng atanga km. 30-a sânga boruak nemna nen a intluk tih an hmu chhuak bawk. Chuti ang boruak tlêm leh thâwlna hmun chu a vawt hle a, chhûm pawh a inslam thei zen zen dawn lo tih a chiang mai. A tuamtu boruakah chuan Carbon dioxide a tam ber lehngal a; chuti ang dinhmunah chuan thil nung lian deuh chite chu a awm theih a rinawm lo zawk mah ta a ni.

Mariner 4 hnuah hian Mariner 6 leh Mariner 7 te pawh thawn an ni leh a; hnaitê atangin thlâ an han la a. Heng atangte pawh hian thil nung han awmna chi a ni lëvin an ring deuh deuh va. Nimahsela, heti chung pawh hian scientist thenkhat chuan nungcha eng emaw tak chu a awm an la ring ta tho mai.

Kum 1971, November ni 13 khan Mariner 9 chuan Mars a han thleng ve leh a, hnaitê atangin a han hêl pap pap a. A tirah chuan thli a lo tleh avangin Mars hêltu thlate : Phobos leh Deimos thlâ a han la phawt a, thlipui a reh hnu chuan Mars thlâ chu a la ta a. Tlangkâng hnuhma tam tak a thlalâkah chuan a lang a. Tlangkâng pakhat, Mount Olympus phei chu a zau zâwng, a laia hawlh tlangin km. 600 leh a sâh zâwng km. 25 lai a ni a; solar system-a tlangkâng zingah a lian ber a nih an ring hial a.

Mariner thlalâk hian lei atanga an hmu thîn khawi lai emawa thil rawng inthlak, thlai ni ngeia an lo rin thîn

chu thlai ni lovin vaivut thliin a len avanga lung dum lo lang thin a ni tih a tichiang ta a; tui kawng ni âwm tak an hmuh thinte pawh a entute ngaihbelna mai a ni tih min hrilh ta bawh.

Kum 1975 khan America chuan boruak lawng pahnih Viking 1 leh Viking 2 a tir leh ta a. Viking 1 hi August ni 20-ah an kâp chhuak a, Viking 2 hi September ni 9-ah an kâp chhuak thung a. Boruak lawng pakhat hian bung hnih a awm a. A bung khat Orbiter chu Mars lo hêl kual tura an ruahman a ni a , thlâ a lo la reng ang a; chutih laiin a bung leh lam Lander thung chu Mars-ah han tuma enchhinna eng emaw zât ti tura ruahman a ni thung. Hemi hma hian Russia boruak lawng chu tum tura tirh a lo ni tawh a. Amaherawhchu, vânduaithlak takin a tum dawn hnaihah, rin phâk loh khawpa thlipui nân a



Viking Lander

nuai vak mai a, a tum thei ta lo va. Hetiang thil a lo thlen tawh avang hian han tum chiah chu thil harsa leh huphurhawm tak a ni tih an hre lâwk a, ngun takin Mariner 9-in thlâ a lâk tawhte kha an zir a.

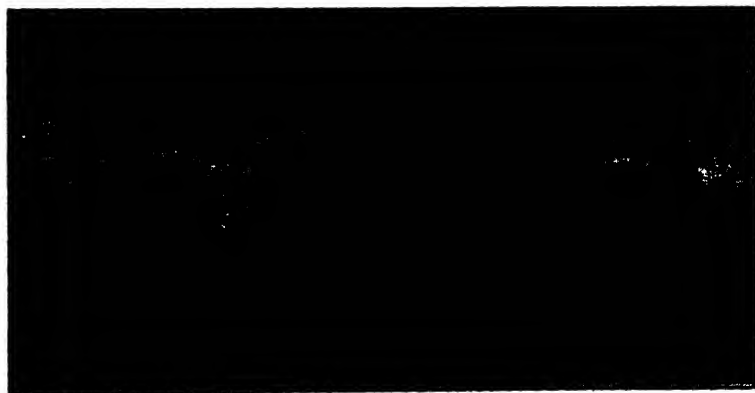
Ti chuan Viking pahnihte Lander tumna tur atân chuan hmun zâwl leh rualrem tha lai bera an ngaih chu an thlang ta a. An fîmkhur tehlul nen, Viking 1 Lander chu a tumna tura an ruata tum a tum laiin a rualrem lo hle a ni tih an hmu chhuak leh ta thut a, a tumna tur pawh an thlâk leh ta chûk chûk a. July ni 20, 1976 khan phaizâwl, Chryse an tih hmunah chuan a tum thei ta hrâm a. He phaizâwl hi tûn hmaa Mars leilung a hnâwn deuh laia tui luanna thin niin an ngai. Viking 2 Lander chu September ni 3-ah a tum ve leh a.

Viking-te hian thlalâkna tha tak an keng a, chung thlalâkna hmanng chuan ram leilung thlâte pawh an la a. Kan lei atanga a sena a lanna chhan ni âwma an lo rin lâwk pawh a lo ni ngei a, thir tuiêk (Iron oxide) a tamzia pawh an hre Chiang leh zual ta a ni.

Kan hriat châk ber zawk, thil nung hnuhma hmuh tur a awm tlât lo thung. Hnim a awm lo a nih pawhin rungcha kawh awnianga w pawh awm ni se, thlalâk atangte hian hriat theih ngei tur chu a ni a. Amaherawhchu, Viking thlalâkte ngunthlûk taka rei fe an zir hnuah pawh thil nung chu sawi loh, an hnuhma tak ngai pawh an hmu ta chuang lo va.

NASA chuan kum 1996 December ni 4 khan boruak lawng Pathfinder chu Mars-a tum turin a kâp chhuak a, a

kum leh July ni 4-ah tluang takin a han tum thei a. Kum 1976-a Viking boruak lawng an thaw n hnua research mûmal tak ti tura an thaw n lehna a ni a, sênso tlêm zawka boruak lawng thaw n kawnga an hmalâkna hmasa a ni baw k. Pathfinder thil hmuh atang hian hmakhawsângah chuan Mars-ah hian tui a lo awm ve taw h thin niin a hriat a; amaherawhchu tûn ang dinhmun a lo awm tanna paw h a rei lo berah kum tlûklehdingâwn 1.8 nia ngaih a ni. A leilung pâwnlang chu kan awmna lei nen an inang viau va, a chhungril chu thûr sakhat (metal) km 1300 atanga 2400 nia hriat a ni. Pathfinder hian Mars leilunga vak kual tur Sojourner a keng tela, hei hian boruak awm dân zirin, leilung te la khâwmin a zir a, a hlawhtling hle.



Pathfinder

Kum 2003 June ni 10 khan NASA chuan boruak lawng Spirit chu Mars zir turin a kâp chhuak a, a hnu lawk July ni 7-ah Opportunity a kâp chhuak leh baw k. Spirit hian

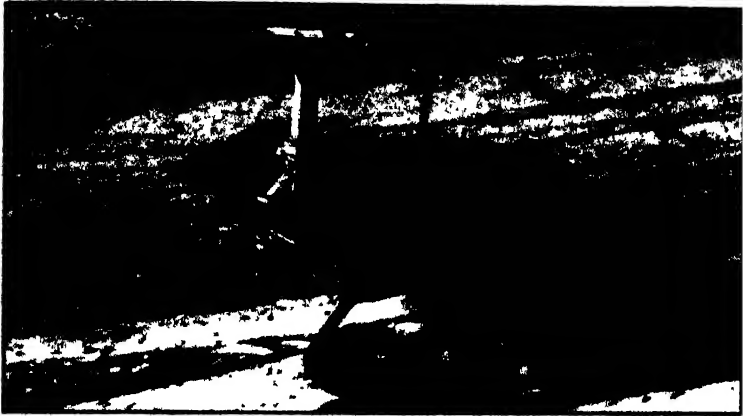
January ni 4, 2004-ah Mars a han thleng a, Opportunity hian January ni 25, 2004-ah a thleng ve leh a.



Spirit

An boruak lawng kah chhuahte hi ni 90 chhung vël Mars leilung chanchin zir chiang tura tih an ni nain ni 2400 lai mai vâk kualin hna an thawk a, robot changkâng tak hmangin an tumna hmün atanga thui tak tak te an vâk kual thei a, Spirit leh Opportunity-te hian hmakhawsanga Mars dinhmun chiang leh zualin min hriattir a, hmân lai chuan tuipui te pawh a lo awm ve tawh ngei niin hriat a ni a, thil nungte awm theihna dinhmunah a lo ding tawh niin an ngai. Kum 2010 March thla atangin Spirit khâwl chuan signal a rawn thawn ta lo va, a reh ta vang vang a, Opportunity erawh a hnu rei fê chhung a la nung thung a. Spirit leh Opportunity-te hian lei lamah thlâlâk tam tak an rawn thawn a, Mars chanchin kan hriat belh tam hle.

America bawkin kum 2007 August ni 4 khan boruak lawng Phoenix chu Mars hmar tâwp lam zir turin a kâp



Opportunity

chhuak leh a. He boruak lawng hian May ni 25, 2008-ah a han thleng a. Mars hmar tâwp rama boruak lawng thawh hmasak ber a ni a, a leilung awmdân te, tui a awm leh awm loh te leh thil nung awm leh awm lo te a han chhui ber a. Mars hmar tâwp ramah hian vûr a awm tih a han chian a, thil nung chi khat *bacteria* awm theihna tura bâwlhlo mamawh ang pawh a leilungah hian a awm tih hriat a ni ta bawk.

America boruak lawng Reconnaissance Orbiter chuan kum 2006 atang khan Mars a thlawh hual tan tawh a, hmun hrang hrang thla a lâkte chu leiah a rawn thawh zêl a. A thlalâk atang chuan Mars-ah hian tûn dinhmunah pawh tui a awm a ni tih an hre thei ta a. August ni 4, 2011 khan NASA scientiste chuan hmun hrang hrangah tui

luang an hmuh thu an puangzâr ta a. Heng tuite hi chi tui, al tak niin an hria. A tlângpuiin hmun lum lai, Nî hnaih laiah an hmu deuh ber a. Hetia tui luang te hial an hmuh takah chuan scientist hote an phûrin, thil nung awm theihna a nih an rinna a tizual hle.



Reconnaissance Orbiter

Mars hi planet zînga kan thenawm hnai a nih mai bâkah thil nung awm theihna nia rinna lian tak a awm avangin planet-ho zîngah chuan rilru la ber a ni a, America pawhin a chanchin Chiang leh zuala hriat tumin a bei ngawrh hle. Kum 2011 November ni 25-ah America chuan planet dang zir tura boruak lawng a thawn chhuah tawh zînga a lian ber leh changkâng ber, hmanraw changkâng tak taka thuam Curiosity chu Mars lamah kâp chhuakin, he boruak lawng hian August ni 6, 2012-ah a han thleng a. Mars leilung pâwnlang leh chhungril te hmanraw hmanga la khâwmin a nihphung ngun takin a zir a,

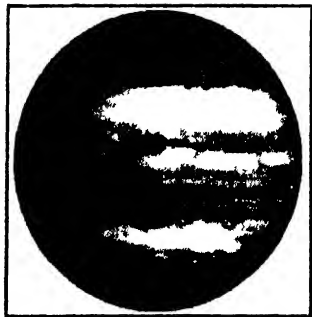
hmakhawsânga sik leh sa dinhmun te, thil nung awm theihna a lo nih thin dân emaw, tân dinhmunah pawh thil nung a awm leh awm loh te, thil nung awm theihna tur a nih leh nih loh te a zir zêl a. A rei lo berah ni 686 vêl tal chu thil zir hna thawk tura ruahman a ni a.



Curiosity

Jupiter - Planet zînga lian ber

Mars dawta planet dang awm chu Jupiter (Hrangchhuana) a ni a. A awmna a hlat êm avangin hun rei tak chhung chu a chanchin an hre tlêm hle. Ngun taka zirtute chuan nî (sun)-a awm ang chi boruak chi hnih hydrogen leh helium tam tak a awm ve avangin arsi leh planet



Jupiter

inkâr dinhmunah a awm niah an ngai. A tuamtu chhûm rawng hrang hrang inthuah tup maite chu a mawi hle.

Scientist thenkhat chuan hun rei tak kal taa kan lei awm dân angin, nuna lo intan theihna turin muangchângin Jupiter boruaka bâwlhlote (chemicals) chu an inlûmlet mek niin an ngai bawk.

Chhûm chhah tak km. 1000 vêl laiin a tuam avangin a leilung awm dân hriat chian a har hle a. A tuamtu chhûm chhah tak chu a leilung depah phei chuan a bit êm êm a; tui tam tak a pai bawk niin an hria a. Chhûm hnuaiah chuan hydrogen tui tam takin a pawnlâng hmun tam tak chu a khuh a. Chumi hnuaiah chuan a chhungril, kan lei ang tiat lêng lăwng, lung chang tak awmin an ring.

Kum 1973, December thla khan America boruak lawng, Pioner 10 chu Jupiter hnaih takah a han thlăwk a. A kum leh December thlaah pawh America boruak lawng bawk Pioner 11 chu hnai takah a han thlăwk leh bawk a; chanchin kan hriat belh ta zêl a. Kum 1977-ah America chuan boruak lawng pahnih Voyager 1 leh Voyager 2 a kâp chhuak leh a. Voyager 2 hi August ni 20-ah kâp chhuakin, Voyager 1 hi September ni 5-ah a kâp chhuak thung a. Voyager 2 hian July ni 9, 1979-ah Jupiter a hnaih lai ber a han thleng a, Voyager 2 hian kum 1979 vêk, March ni 5-ah Jupiter a hnaih lai ber a han thleng thung a. Heng boruak lawng pahnihthe phei hi chuan chanchin tam tak min rawn hrih thei ta a. Tûn hma atanga an lo hmuh thin, a tuamtu chhuma a sen-lai bik, red spot an tih mai chu eng dang ni lovin chhûm inherh vêl avanga lo insiam a ni tih kan hre ta a. Hei bâkah hian lei atanga an hmuh

theih ngai rêng rêng loh thil kual dal tak, Jupiter hual vêla awm chu an hmu chhuak ta bawk.



Jupiter heltu thlate

Voyager 1 thlalâk aţang hian Jupiter hêltu thlate chanchin pawh eng eng emaw chu kan lo hre thei ta a. Jupiter thla pakhat lo-ah chuan tlangkângte pawh a awm ve thin a, a leilungte pawh kât (sulphur) leh chi a awm avangin rawng eng leh serthlum rawng ang deuhvin a lang thin a ni, tih pawh hriat a lo ni ta. Hei bâkah hian lo hi chhûm chi dang, Sodium chhûmin a bawh reng bawk. Jupiter hêltu dang Callisto leh Ganymede-ahte chuan ṭêk (meteorite) den khuarte leh vûr awmna hmunte pawh an han hmu a. Jupiter thla pakhat Europa chu vûr khal leh lei hnua i tui awmna, thil nung pawh awm ve theihna hial tur niin a thlalâk aţang chuan a ngaih theih a. Hei bâkah hian Jupiter hêltu thla pathum Adrastea, Metis leh Thebe te hmuh chhuah belh a ni bawk.

Saturn - Thla 20 chuang nei

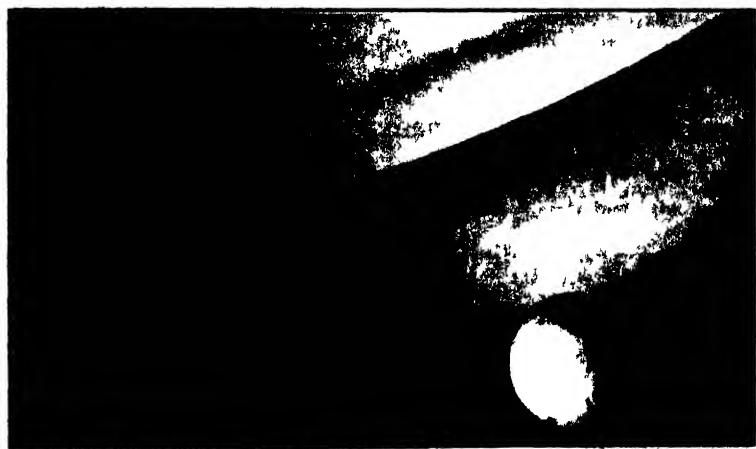


Saturn

Boruak lawng thawh chhuah zînga Saturn b hnai han thleng hmasa ber chu Pioneer 11 a ni. He boruak lawng hi America-in planet-te chanchin zir tur liau hauva a kah chhuah a ni a. Kum 1973 April ni 5-ah kap chhuakin August ni 26, 1979-ah Saturn hnaih takah a han thlawk a, thlalakte pawh lei lamah a rawn thawh a. Pioneer 11 bakah Pioneer 10 pawh Saturn bul hnaihan han thlawkin a thla te a han la ve bawh.

America boruak lawng bawh, Voyager 1 leh Voyager 2-te chuan Jupiter an pelh hnuin, an zin kawng an zawh zêl a. November, 1980-ah Voyager 1 chuan Saturn bul lawk a han thleng a, a kum leh August-ah Voyager 2 pawhin a han thleng ve leh a. Saturn hi a rawng a lâr lo deuh a, chhûm a che nasa lo deuh tih mai lovah chuan Jupiter nen an inang hle. Saturn hi zungbun ang mai thil kual chhah takin a hual vêl a, a mawi hle. He thil kual mak tak mai hi lung nâwi chhiar sên loh lêng vêlin an siam a ni a. Voyager thlalâk atanga a lan dânin he thil kual hi thlûr tam tak inbelh khâwm a ni tih kan lo hre thei leh ta a, a pawn ber phei chu hruizên inherh chuat ang main a inherh a. Saturn-ah hian thlipui na tak mai, dârkâr khata km. 1800 laia na a tleh thin a. Heti anga thli na hi planet dangah a awm kher lo vang.

Lei aṭanga an hmuḥ theih ngai rēng rēng loh Saturn hēltu thlate pawh Voyager hian a han hmu chhuak a, Saturn chuan a tlēm berah thla 20 lai a nei tih kan lo hre thei ta. Saturn thla zīnga a lian ber Titan phe chu planet Mercury aiin a lian zawk mah a. A tuamtu boruakah nitrogen tam tak a awm a. Nitrogen boruak chu khaw vāwt lutukin a titui a, ruah angin a sūr ve thin a ni tih te pawh kan lo hre leh ta zēl a.



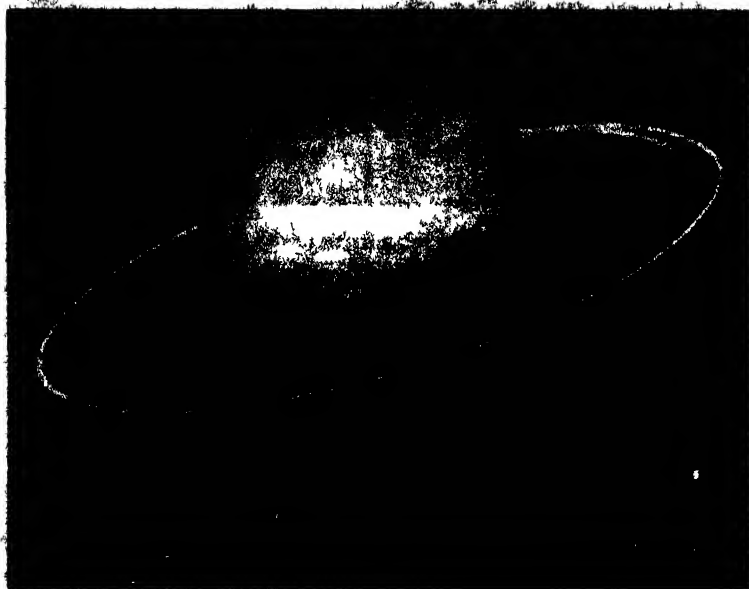
Saturn leh a hēltu thlate

Kum 1997 October ni 15 khan NASA boruak lawng Cassini chu Saturn hēltu thla Titan thlawh huala zir turin tih a ni a. He boruak lawng hian European Space Agency boruak lawng siam Huygens chu Titan leilung zir tur a phur tel bawk a. Cassini hian Titan hēlin, a thla te a la a, kum 2017 thleng hna thawk tura ruahman a ni a. Huyes boruak lawng erawh hi chu Cassini boruak lawng aṭanga

thlāwk chhuaka Titan leilunga han tum tura tih a ni. Titan hian tuang takin January ni 14, 2005 khan Titan leilung a han thleng a. Ruahman lawk aia rei mah a thawh tur ang thawkin, Titāna boruak nemna leh boruak lum dân te, a tuamtu boruak chungchangte minute 90 chhung lei lamah a rawn thawn a. Titan boruak hi a vawh avangin tui pāngngai a awm thei lo va, methane tui awmin, methane dīl te pawh a awm thung a. Scientist thenkhat chuan hetiang methane tui atanga thil nung lo insiam chhuak thei chū hi a awm theih mai ringin an ngaihven hle.

Uranus chanchin hriat belh a ni

Voyager 2 chū Saturn a pelh hnuañ thlāwk zēlin kum 1986, January thla khan Uranus hnaih tak a han



thleng a. Uranus thlâ lain, lei lamah a rawn thawa a. Thlâlak atang hian a tuamtu boruak rawng chu a hring a, boruak chi khat 'methane' tam tak a awm a ni tih a hriat theih a. A tuamtu chhâm chêt vêl dân ngun taka an zir hnuin Uranus hi dârkâr 16 chhungin vawi khat a vir chhuak niin an chhût chhuak bawk. Chumi awmzia chu ni khatah dârkâr 16 a awm tihna a nih chu.

Voyager hian Uranus chanchin dang pawh mìn hrih a. Lei atanga hmuh theih rii riai, Uranus hual vêla thil kual pakua, pan têt têt awm chu chiang takin a thlâ a han la thei a. Chu bâkah chuan lei atanga an lo hmuh tawh, a hêltu thla pangate bâkah thla dang sâwm zet a han hmuh chhuah belh bawk. Heng thlahte hian lei kak leh khuarkhurum thûk tak tak te a awm a, thla pakhat Miranda-ah phei chuan khâm km 5 laia sâng an hmu chhuak a.

Planet hla ber Neptune



Neptune

Tunhmaa planet hla ber anga kan lo sawi thin Pluto chu planet pângngai zînga chhiar tel a nih tâk loh avangin tânah chuan Neptune hi planet hla ber a ni ta. He planet, ní hêltute zînga hla ber chanchin pawh Voyager boruak lawngte atang hian tîem azâwng chu kan hriat

belh leh a. A rawng a pâwl deuh phêtna chhan pawh a tuamtu boruakah methane a tam vang a ni tih kan hre leh ta. Voyager 2 chuan Neptune lenzâwng pawh a hma aia dik zâwkin min hrih thei ta bawh.

Boruak lawng an lo man mai thei

Kan sawi tak boruak lawng Pioneer 10 leh Pioneer 11, kum 1972-a an kah chhuahte kha planet-ho an thlawh pelh hnuah pawha thlâwk zêl tura ruahman a ni a.



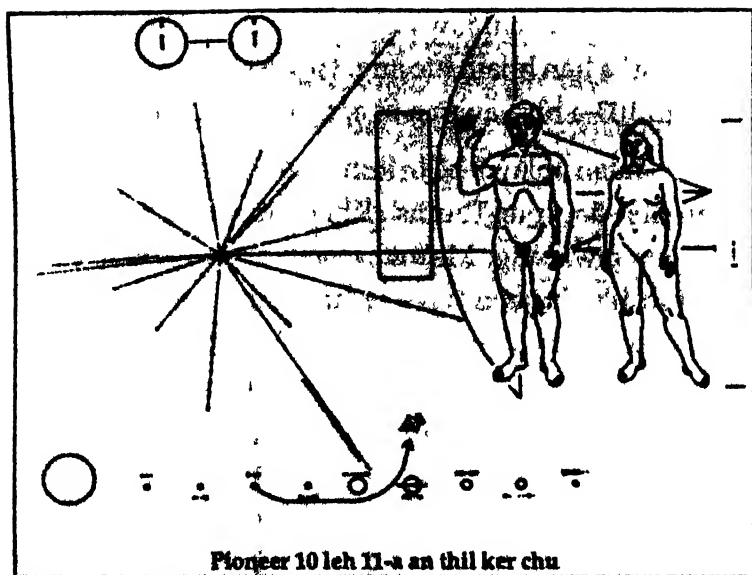
Pioneer 10

Pioneer 10 khan kum 1986, October thla khan planet hla ber Pluto-in nî a hêna kawng laihawi vêl a thleng a, kum 1989 April thla khan Pluto-in nî a hêna kawng hlatna ber lai a thlawh pêl a. Chuta tang chuan dârkâr khatah

mêl 30,450-a chaka thlâwk zêlin kum A.D. 34,593-ah arsi 'Star Ross' a han hnaih hle ang. He arsi hi lei atanga light year 248,103-a hlaa awm a ni a; a hla vang vang hle mai.

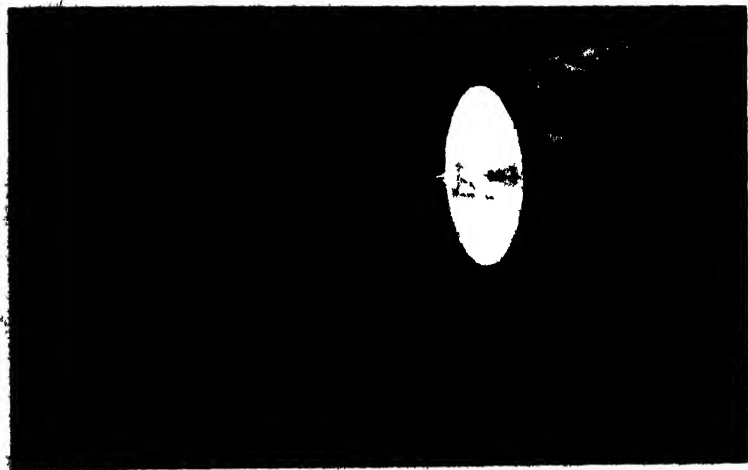
Ti chuan, thlâwk zêlin kum maktaduai 8 hnua h phei chuan arsi lian pui Taurus (Khangtezâwngzîm) a han hnaih hle tawh ang. Mi tute emaw an lo awm a, an lo hmu fuh hlah va, a zin kawngah an lo man emaw a khâwlah chhiatna a awm emaw, vân boruaka thil lêng vêlin a lo tibahlah te a nih loh chuan a zin kawng a chhunzawm zêl ang a, kum tlûklehdingâwn 5 a ral hnua h phei chuan kan awmna Thlasik Kawng hi a thlawh pêl ang. Ti chuan, thlâwk zêlin arsi bawr tlûklehdingâwn tam tak awmna hmun, a zau zâwng pawh kan chhui chhuah theih lohna lamah chuan a zin kawng a zawh tan chauh ang.

Pioneer 11 pawhin Jupiter leh Saturn thla a lâk hnuin Saturn ram a thlawh pêl a, kum 1995 khan lei lam nena inpawhna signal a tâwp ta a. Pioneer 10 ang bawkin a zin kawngah bahlahna a awm loh chuan hriat loh ram vân boruak zau takah a zin kawng a zawh zêl dawn a ni. Pioneer 10 leh Pioneer 11-ahte hian alluminium rangkachaka luan phêkah mipa leh hmeichhe lem an ker a, kan lei awmna leh kan solar system awmna hmun pawh chiang takin an tilang a. A zin kawngah hian lei piah lam miten an lo man fuh hlah a nih chuan kan lei awmna hi an rawn chhui thei mai thei a ni. Mahse, lei mite thil ziah hi an lo hre thiam ang em le?



Voyager 1 leh Voyager 2 te kha kum 1977-a kah chhuah an ni a. An kâp chhuak hnunung zawk nain an thlâwk chak zawk a, kum 1991-ah Pioneer 10 leh Pioneer 11 te kha an thlâwh pēi a. Kum 2025 vèlah a khâwl kente chuan an hnathawh an chawhsan tawh ang a. Voyager 1 hian kum 40000 vèl hnuañ arsi AC+793888 awmna bul vèl a han thleng ang. A khâwl kente hna thawh a tâwp hnuañ pawh an la thlâwk zêl ang a, vān boruak zau takah hian mihring dangte an lo awm mial a nih chuan silver phêka lei tawng chi hrang sawnruk zet maia chibai bûkna thute, leh he leia ri chi hrang hrang te, rimawi hmānlai ber aŋga tūnlai ber chi an thunte chu lo ngaithlain, kan lei awmna chhang taka tihlannate chu an lo hmu ang a, mak tūn mīn rawn zawn chhuah an tum mai thei a ni.

Amaherawhchu, chung hunah meuh chuan he leiah hian mihring an la awm a nih pawhin tûna mihringte nunphung leh awmdân anga awm hi chu a ni tawh kher lovang le.

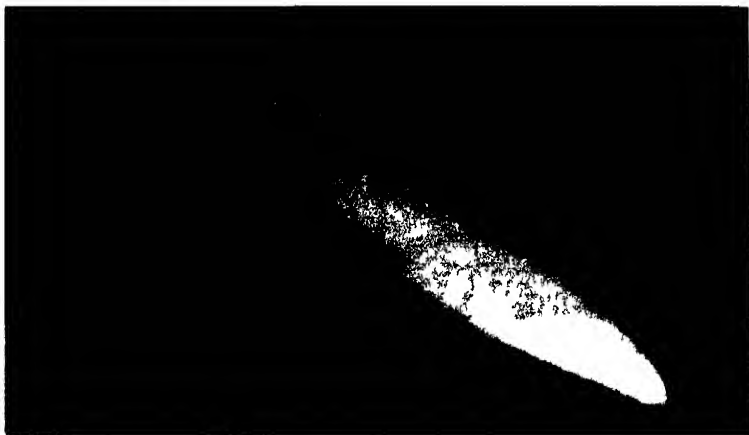


Voyager

Simeikhu 'Halley's Comet'

Kan solar system-ah hian simeikhu tam tak a awm a. Sângkhat dawn lai an chhui chhuah tawh zîngah Halley's Comet hi a lâr ber âwm e. He simeikhu, kum 76 danah a lo lang thin hi a lianin a êng êm êm mai a ni. Mihringten simeikhu kan hriat hmasak ber a ni. A hming hi kum 1705-a kum engzât dânah nge a lo lan thin tih chhût chhuaktu, English arsi chanchin zir mi Edmond Halley-a hming chawia phuah a ni. Kum 1986 kha Halley Comet hian lei a rawn hnaih ber tum a ni a. Tichuan, kum

1986 khan Japan boruak lawng pahnih Sakigake leh Suisei te'n Halley's Comet laimu atanga boruak leh thil nawi lo phuh chhuak chu an han zir a. Russia boruak lawng pahnih Vega 1 leh Vega 2 te pawhin a lu lam km. 100,000 lai mai boruak leh thil nawi tam tak chu an han tan tlang a, a laimu thil an han la a. A mei leh a lu a boruak leh thil nawi zawnzawnzawn h a laimu atanga lo chhuak a ru th an han chuan a.



Simeikhu Halley's Comet

Kum 1985, July thia khan Europe ram hrang hrang tangrua, European Space Agency chuan Halley's Comet chanchun zir turin boruak lawng Giotto chu an thawm chhuak baw a. He boruak lawng hian kum 1986 March ni 13 khan simeikhu chu a han luhchilh ta a. Chu tia simeikhu chak taka kal ve bawk nen an han intawk ta mai chu a thlawk chak fia fia hle. Darkar khatah km. 240,000 iaia chaka thlawk ang a ru a, rifle mu aiin a let 50

laiin a chak a nih chu! Hetia a thlawh pah hian thlâ a la zêl a. Amaherawhchu, thil nâwi lêng vêl chu a sut nasat tâk êm avangin a laimu a thlen hmain a thlalâkna a chhe ta a. Eng pawh ni se, a thlalâk rawn thawh atangte chuan chanchin Chiang zawk kan hre thei ta a. Hei simeikhu laimu hi alu lianpui a ang ber âwm e. A sei lai chu hawlhtlangin km. 15 a ni a, a tâwi lai chu a laia hawlhtlangin km. 8 a ni thung. A laimu pâwn chu meihawl dum ang hian a tuam a, chumi hnuaiah chuan vûr tlang leh Carbon dioxide leh bawhlhlawh nâwi a awm a. Simeikhu laimu chu vûr tlang bâl tak a nih mai chu.

Arsi dang hêltu planet

Ni khi arsi tlukleh ding awn tam tak zînga arsi narân pakhat a ni ve mai a. Chuti a nih chuan nî ang bawh hian arsi dang engemaw zât khian hêltu an nei ve ngei ang tih a rinawm hle. Amaherawhchu, nî vêla inherite pawh kan la hire Chiang lo hle a, chutih lai chuan hla lutuka awm arsate hêltu han chhui chu thil har tak a ni. Hetiang arsi dang hêltu planet-te hi sâp tawng chuan *extrasolar planet* emaw *exoplanets* tiin an sawi thin a.

Kum 1992 khan kan awmna atanga light year 980 vêla hlaa arsi pakhat chuan hêltu planet pahnih a nei tih hmuh chhuah a ni a; a pakhat zawk chu PSR B1257+12B tiin a hming an vuah a, Europe khawmual aia a let li vêla lian a ni a. Heng planets-te hi thil nung awmna chi a ni lo tih hriat a ni bawh.

Kum 2009, March ni 6 khan NASA chuan exoplanet-te chhui tur bik entlang chu vân sâng boruakah a kâp chhuak a, April ni 7-ah he entlang hian a awmna tur a han thleng a. He entlang hmanga chhuitu scientist-te chuan exoplanet 7 an hmu chhuak a, kan ni anga exoplanet eng emaw zât nei pakhat pawh an hmu chhuak bawk. Heng bâkah hian exoplanet ni thei awm 700 lai an hmu a, chik zawka la zir chian erawh a ngai a. An chhût chhin dân chuan kan awmna thlasik kawngah hian exoplanet, thil nung awmna tura tui awm theihna, vawt lutuk emaw lum lutuk emaw ni lo hi 1,00,000,000 lai awmna an zing zu nia!



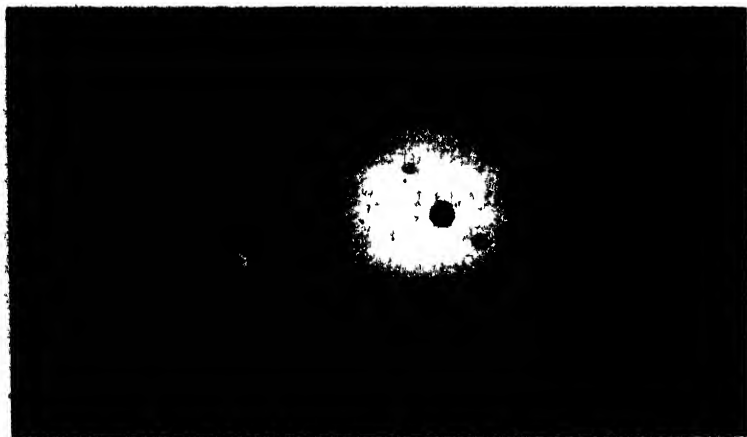
Exoplanet Zirconia

Kum 2010 September ni 29 khan kan awmna lei ang vel tura beisel exoplanet chu hmuh chhuah a ni a. A

hmangah Zarmina an vuah a. He exoplanet hi arsi Gliese 581 hêltu a ni a, tui awm theihna tur leh thil nung pawh awm theihna tur boruak lum lutuk lo leh vawt lutuk lo lai nei hriat a ni a, kan lei aiin a lianin a rit deuh hlek a, an hria chak zâwng a inang thawkhat a. Zarmina pang leh lam hian Gliese 581 arsi chu a chhawn reng a, a pang leh lam thung erawh chuan arsi lam hi a hawi ngai lo thung. Chumi awmzia chu, a pang leh lam chu chhûn a ni reng a, boruak pawh a lum êm êm a, a pang leh lam chu a thim a, a vawt thung tihna a nih chu. Scientist-te chuan Zarmina chhûn leh zân inrina lai vêl boruak hi thil nung lo insiamna atâna boruak tha tak a nih ringin, helai hmunah hian thil nung an lo awm tawh mai thei, tih beiseina an nei a, thil nung tâna chên theihna a nih ngei an ring hle.

Gliese 581 arsi hian kan Nî angin hêltu exoplanet a nei ve a, paruk chu hriat chian a ni tawh nghe nghe a, kan *solar system* nen inang hlea hriat a ni a, heng exoplanet-te hian hêl lehchhâwngtu thla te pawh nei ve ngeia rin a ni bawk. California University-a Zarmina hmu chhuaktu zînga an hotupa ber pheichuan Zarminaah hian thil nung an awm ngei ang tih a rinhleh loh thu a sawi hial nghe nghe. Eng pawh ni se a awmna a hlat êm avangin eng nge dik ber tih finfiah tur chuan hun a là duh deuh dawn a ni.

Kum 2011 February ni 1 khan Kepler Telescope hmanga zirtu scientist-te chuan kan solar systema Nî anga hêltu nei arsi an hmuh chhuah thu an puang a, arsi



Kepler - 11 arsi leh a heltu exoplanet-te

hmingah hian Kepler-11 an vuah a. He arsi hi kan awmna atanga light year 2000 vela hlaa awm a ni a, a heltu exoplanet-te hi lung leh gas inpawlhin a siam a ni a, kan lei aia lian thiau paruk chu a hre chiang tawh a, a dang an zawn belh mek pawk. Engpawh ni se, heng exoplanet-te hi chu an awmna han chhutin thil nung awm theihna turah an ngai lo thung.

Exoplanets hi an hmuh chhuah belh zel a, hriat chinah kum 2012 chhung ngawt pawhin pali hmuh chhuah belh a ni a. An hmuh chhuah zinga pakhat chu kan awmna atanga arsi hnai berte zinga mi Alpha Centaury heltu a ni a, October ni 17 khan hmuh chhuah a ni. He exoplanet hi a sat em avangin thil nung awm theihna chi a ni lo va; amaherawhchu Alpha Centaury heltu dang la hmuh chhuah loh a la awm ngei an ring.

6

THLA LEM

Kan awmna lei hi thla (moon)-in a hêl tih kan hre theuh âwm e. Mihring siamchawp, kan awmna lei hêl tura an kah chhuahho hi thla lem 'artificial satellite' an ni a. Bung hnihnaa kan sawi tawh angin thla lem hmasa ber chu kum 1957, October ni 4-ah Russia-in a kâp chhuak a; chu chu vân lam hun lo intanna a ni kan tih tawh kha. Mihring chuanna boruak lawng kah chhuah a nih hian a lâh hle thin nain mihring an thawn hi chu boruak lawng leh thla lem an kah chhuah tawh zawng zawng chhût chuan tlêm tak a ni. Kum 1980 thlenga khawvêl ram hrang hrangin thla lem leh boruak lawng an kah chhuah zawng zawng kha a vaiin 2500 chuang a ni a, chung zingah chuan mihring chuanna boruak lawng chu 76 chauh a ni.

Tûnah hian ram hrang hrang thla lem 3000 chuang daihin kan lei an hêl mek a, chung zinga 560 vêl chu tangkai taka hman mek an ni. Thla lem tam tak chu lei an hêlna kawng aṭanga la sawnin lei tuamtu boruakah kan raltîr an ni a, chuti chung pawhin tûnah hian thla lem hman tawh lohte leh thla lem leh rocket leh boruak lawng keh them tam tak an la kat nuk nuk a. US Space Surveillance Network-in an chhût dânin kum 1957 aṭanga kum 2012 thleng khan thla lem leh hetiang keh them vân

boruaka leng vèl hi 26000 chuang a ni tawh a, chung zinga 8000 aia tam chuan tûnah hian vân sâng boruak atângin lei hi an hêl reng a a ni.

Thla lemin lei a hêl dân hi thil mak ang reng tak a ni a. Hruí hmáwrah lung tê nghet takin thlung íla, hruí hmáwr lehlamah chuan chêlhin han vir vak íla, lung tê chuan per chhuah a tum ang a; mahse kan thlunna hruí chuan a chêlhi tlat avângin chhuak thei lovin a vir kual pap pap mai ang. Thla lemin kan lei a hêl dân pawh hi hêlhang deuh hi a ni a, kan lei chhuahsan tuma tan a lâk lain kan lei hîpna hruí fei tak chuan a lo pawt tlat a, a tâl chat thei bawk si lo va. Ti chuan, leia tla si lo, tâl chhuak thei si lovin lei a hêl ta a ni.

Thla lemte hian lei an hêl dân azir te, an awmna sân dân azir te, an hman dân azir tein chi hrang hrangah then an ni a. A awlsam zâwngin an hman dân atângin then mai íla a tha áwm e.

Inbiakpawhna thla lem

Inbiakpawhna, thu thawwna, radio leh TV programme thawwn chhâwn nâna hman thla lemte hi Communication Satellite an ni a. Russia thla lem Sputriuk 1 khan radio transmitter chu a keng tel nain kum 1958-a America thla lem kah chhuah pakhat Score. (Signal Communication by Orbiting Relay Equipment) kha inbiakpawhna thla lem hmasa ber kan ti thei ang. He thla lem hian lei atanga thu thawwn lo dawngin lei lamah a thawwn chhâwng leh thei a. Hetih laia US President

Eisenhower-a chuan khawvêl ram hrang hrangah Christmas lawmpuina thu puan chhuah nân a hmang nghe nghe a ni.

Thla lemte hi an awmna a sân avangin hmun kar hla zawk inbiak pawh nân a tangkai dawn bâkah thîrhruì tel lova hmun hla tak taka mi han inbiak theih ta mai chu sum sên pawh a tlêm zawk ngei ang tih ngaihtuahna a lo awm chho ta zêl a. T.V. programme thawn nânte leh ram vênhimna lamahte hlei hlei a tangkai dawna rinna lian tak a lo awm ta a. Kum 1960 a lo nih chuan America chuan a rama sipai hmun hrang hranga awmte inbiak pawh theihna turin thla lem Courier chu a kâp chhuak ta a, tangkai pawh a tangkai hle. Thla lem dang Echo 1 leh Echo 2 pawh kum 1960 leh kum 1964-ah America bawkin inbiak pawh nân a kâp chhuak bawk.

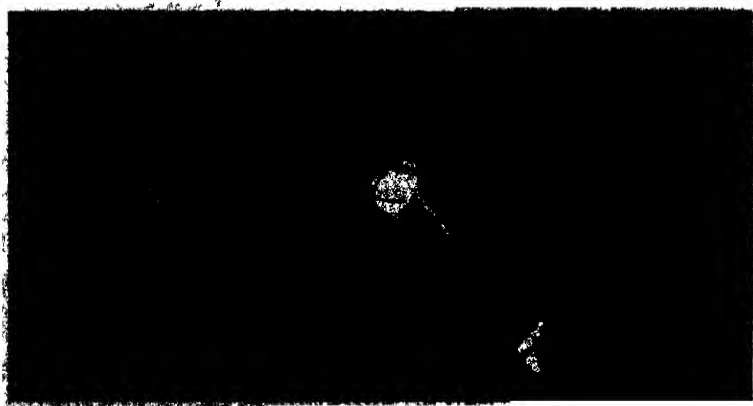


Thla lem tangkaizia hriain kum 1962 July ni 10-ah thla lem dang 'Telstar' chu America bawkin a kâp chhuak leh a. He thla lem phei hi chu America atanga Atlantic tuipei pêla radio leh T.V. programme thawn chhâwnna atâna hman a lo ni ta hial a. Telstar bâkah hian thla lem dang 'Relay' an tih pawh hemi kum vêk December ni 13-ah an kâp chhuak bawk a; a thawh dân pawh Telstar nen a inang hle. He thla lem hi kum

1963 November ni 22 atangin Pacific tuipui pëla TV programme thawn nân an hmang ta a ni.

Heng thla lemte hi tangkai hle mah se, dühthusam lohna a la awm tlat mai. Därfär thum chhungin lei vawi khat an hël chhuak zêl a. Leia a khâwl pui awmna atanga an lan theih lai chauha hman theih an nih avangin lei pang leh lama an awm lai chuan hman theih an ni lo va; chu vangin duh hun hunah inbiakpawh theih a ni lo va, a buaithlak ang reng hle a. Ti chuan, he harsatna sukiang tur hlan tan an la leh ta char char a.

Thla lem hi a awmna a hniam chuan lei hël thei tur chuan chak taka a thlawh a ngai a, a awmna a sân poh leh a kal muan a ngai thung a. Km. 35,900-a sanga dah theih phei chuan lei vir rualin lei a hël thei dawn a ni. Chumi awmzia chu, Aizawl chung zawn km. 35,900-a an dah theih chuan lei vir rual chiaha a kal ve avangin Aizawl



Geostationary satellite

chung zâwnah a awm reng dawn tihna a nih chu. Englai pawha hman theih tur chuan chuti ang thla lem, awm hmun sawn lo ang mai chu a tangkai dawn a ni. Hetiang thla lem kal kawng, km. 35,900-a sâng hi 'geostationary orbit' an vuah a, hetiang thla lem 'hi 'geostationary satellite' an vuah.

Geostationary orbit-a thla lem dah chungchâng hi kum 1945 khan Arthur C. Clarke-a'n a thawnthuah a lo ziaak tawh a. Lei atanga km. 35,900 atang chuan kan lei hmun thuma thena hmun khat hi a lang thei a. Thla lem pathum inkâr



Syncom 3

hlat dân inang chiaha han dah thei ta ila, lei pum pui chu an tuam pha dawn tihna a lo ni a. Kum 1964, August ni 19 a lo nih chuan America chuan thla lem Synom 3 chu lei vir rual chiaha kal ve thei turin geostationary orbit-ah

chuan a han dah thei ta hlah mai le. Vâneithlak takin Japan rama khawvêl intihsiakna ropui Summer Olympic an nghah kum a lo ni hlah bawk lehngal a. Ti chuan, he thla lem kal tlang hian Japan rama an infiam lai chu America mipui chuan an tapchhak zâwl atangin an lo thlîr thei ta reng mai! Hma la chho zêlin khawvêl ram hrang hrang tangrual Intelsat (International Telecommunication Satellite) Corporation hial an lo din thei ta.



Inset

Khawvêl huap inbiakpawhna thla lem Intelsat hmasa ber 'Early Bird' chu kum 1965 April ni 6 khan kah chhuah a lo ni ta a, telephone channel 240 leh T.V. channel 1 a awm a. Kum 1967 chuan Intelsat 1 thla lem pathum lai Atlantic tuipui leh Pacific tuipui chungah dah a lo ni a, kum 1968-ah phei chuan Atlantic tuipui, Pacific tuipui leh India tuipui chungah Intelsat III thla lemte chu an dah ta a; khawvêl hmun hrang hrang atangin kan inbe tawrin T.V. programme kan in thawin tawin thei ta a ni. Hemi hnu hian Intelsat IV te, Intelsat IV te leh Intelsat V-te a hmasa mite thlak turin an kap chhuak leh a. Kum 1984 leh 1985- a an han dah Intelsat V-A thla lemahte phei chuan telephone channel 30,000 leh T.V. channel 12 lai a awm thei ta.

Inbiakpawhna thla lem hi ram thenkhatin mahni pualin an nei ve bawk. Kum 1965 April ni 23 khan Russia pawhin thla lem Molniya a kap chhuak a; Canada-in kum 1972 November ni 9-ah Arik thla lem a kap chhuak bawk. Ti chuan, kum 1981 thleng khan khawvêl ram zinga panga : America, Russia, Canada, Indonesia leh Japan-ten anurahni pualin thla lem an nei a. India pawhin kum 1982 khan Intelsat a kap chhuak ve ta a; Ti chuan, mahni puala in pawhna thla lem nei partukia a lo ni ta a ni. Kum 1983

khan European Space Agency pawhin European Communication Satellite (ECS) panga zet a kâp chhuak a, Europe ram hrang hrangte leh an thenawm ram Middle East leh North Africa ramte chu awlsam takin heng thla lem hmang hian kawng hrang hranga inpawhin vâw lam hnasa wnna chu an chhawr tangkai hle.

Thla lemte hi khawmual sipai hmun hrang hranga awnte chanchin inhrilh tawna atân te, missile phurtu tui hnuai lawng leh khawmuala hmunpui inbiak pawh nân te America leh Russia chuan an hmang nasa hle. United Kingdom pawhin a sipai hmun hrang hranga awnte inbiakpawh nân thla lem a hmang bawk. America chuan lawng pakhat atanga lawng danga mi inbiak pawh nân leh tâng pakhat atanga tâng danga mi inbiak nânte a thla lem Taesat chu a hmang tangkai hle. Kum 1976 khan tuifinriata lawng zin leh khawmual lam inbiak pawhna turin thla lem 'Marisat' chu a kâp chhuak a, hetiang chi bawk 'Fleetsatcom' chu tuipui sipaiten inbiak pawh nân an hmang. Kum 1981 khan European Space Agency pawhin tulpula lawngte leh khawmual lam inbiakpawhna atâna hman turin thla lem Marecs chu vâw sâng hman hian dah ve ta bawk. European Space Agency bawk hian kum 1990 khan thla lem lian tak mai a hlai kawng metre 60 met mai 'Olympus' chu inbiakpawhna turin TV programme thauv chhawna atâna hman tur chhu a kâp chhuak leh ta bawk.

Kum 1990 hnu lam atang pheii chuan thla lemte hi internet hmanga khawvêl hmun hrang hranga mite

inzawm nân hman a lo ni ta a. Tûnah hian thla lem 100
 ala tam mah chu hetiang inbiak pawh nân leh TV
 programme thawn chhawn nân hman mek a ni.

Khaw awmdân hriatna thla lem

Khaw awmdân hriatna tura thla lem an kah chhuahte
 hi 'Meteorological Satellites' emaw 'Weather Satellites'
 tia sawi an ni thûn a. Heng thla lemte hian khaw awmdân
 an thlir reng a, chhâm kal dân te, khaw lum leh vawh
 chungchâng te, thli tleh leh ruah sîr dân zawnzawngte
 a thla nen lam leiah an rawn thawn thla a; chung aţang
 chuan khaw awmdân leh awmdân tur kan lo hre lâwk
 thei ta hial a ni.

Khaw awmdân hriatna thla lem hmasa ber chu kum
 1959 February ni 17-a America kah chhuah Vanguard II a
 ni a, Khaw awmdân thla chhâng taka latu hmasa ber chu
 America thla lem bawk Tiros I a ni. He thla lem hi kum
 1960 April ni 1 khan kah chhuah a ni a. Hemi kum vêk



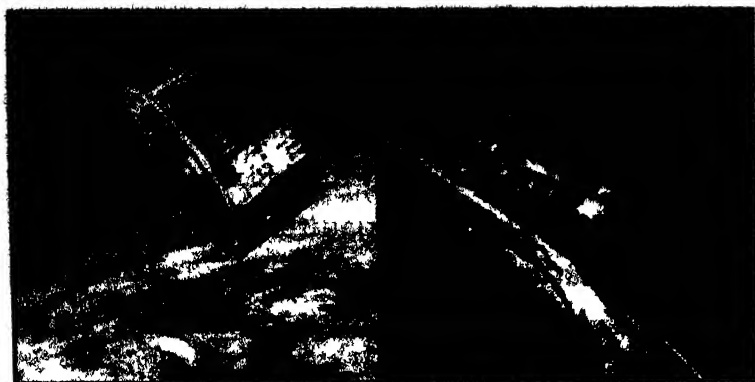
Vanguard II

Tiros I

November ni 23 khan Tiros II pawh an kâp chhuak leh a. Kum 1961 July ni 12-a an kah chhuah Tiros III pheih chuan Atlantic tuipui chungah thlichhe hlauhawm tak 'Hurricane Ester' chu a hmu chhuak a. He thlichhia in a nuai ngei tur ramte chuan he thla lem hriattirna avang hian an lo inhlirng hman a ni. Tiros III hnuah hian Tiros thla lem paruk lai an kâp chhuak leh bawh a, thlalâk tam tak lei lamah an rawn thawn a.

America chuan Tiros thla lemho a kah chhuah hnu hian kum 1964 atang khan thla lem dang Nimbus a kâp chhuak leh a. Nimbus I chuan Hurricane thlipui tleh dân chiang zâwkin a rawn hrilh thei a. Kum 1966 May ni 15-a a kah chhuah Nimbus II pheih chuan khawvêl lum leh vawh dân tlângpui a rawn hrilh thei ta hial a. Hetih lai hian Russia pawhin thla lem Meteor hmangin hma nasa tak a lo la ve tawh a. Ti chuan, America thla lem leh Russia thla lem atanga an thil hriatte chu inhrilh tawnin khawvêl ram hrang hranga khaw awmdân tur tlangpui chu an hre lâwk thei a lo ni ta dêr mai.

Khawmual chanchin chauh ni lovin tuifinriat lum leh vawh dânte leh vur awm dânte pawh hriat theih a lo ni ta. Thla lem kan sawi tak bakah khan a hma aia tha thla lem dang ESSA leh NOAA-te pawh vân sâng boruakah dah an ni leh a.



Eosa

Noaa

Heng thla lemte phehi hi chu a hmaa mite aiin an changkang zawk lehngal a. Ram hrang hrangin hma an sawn zel a, thla lem dang America kah chhuah GOES (Geostationary Operational Environmental Satellite) te, Europe atanga an kah chhuah Meteosat te, Japan kah chhuah GMS (Geostationary Meteorological Satellite) te, China thla lem Fen- Yun te leh a hmaa an kah chhuah dangte hman chuan khawvel ram hrang hrang tangualte chuan khaw awm dan tur a hma thei ang bera puang lawk thei furin tan an la chho ta bawh a.

Thla pawh in ram dang ta a hman theih tho bakah an chhuah a thla lem hma chhuah insat thla lemte chu khaw awm dan tur furin lawkna atan a chhaw tangkai hie Kema ram kilkhaw bera pawh khaw awm dan tur tlangpui chu kan hre lawk ve thei ta a nih hi!

Ram leilung hausakna chhuitu thla lem

Thla lem leh boruak lawng an kah chhuah tawh zinga eng emaw zât khan kan awmna lei thlâ lain, kan lei chanchin tam tak min hrilh tho nain, ram pianzia leh nihphung te, ram ngaw leh leilung hausakna chhuina atân leh enkawl na atân bika hman tur thla lem an kâp chhuak bawk. Hetiang thla lemte hi 'Remote Sensing Satellites' emaw Earth Observation Satellites' tia sawi an ni thin.

Ram thla laa, ram leilung hausakna chhui tur bika an siam Landsat-1 chu kum 1972, July thla khan America chuan hlawhtling takin a kâp chhuak thei ta a. He thla lem hi metre 3-a sei metre 1.5 a lian, phêngpnehlep ang thla pahni nei a ni a. A thla pahnihte hi chakna lo dawngsawng tura siam an ni a. He thla lem hian thlâlâkna tha tak a keng tel bawk. Thla lem dang ang bawka hna thawh theih loh hun nei a nih avangin a hnuah a thlâk turin a dang an kâp chhuak zêl a; eng emaw zât an kâp chhuak tawh a ni.



Landsat

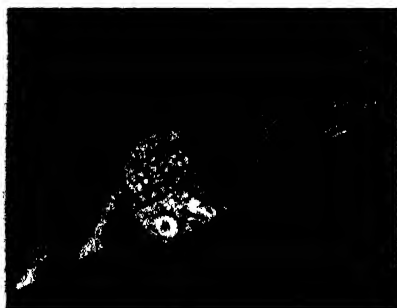
Landsat thla lem hi a awmna ngaia awm reng ang chi Geostationary satellite ang kha ni lovin chhim tâwp leh hmar tâwp tantlanga chhim leh hmar zâwnga lei hêl chi 'Synchronous satellite' a ni a, lei atanga



Sunsynchronous satellite

km. 900 a sâng atangin ni khat chhungin lei vawi 14 a hêi chhuak hman a, chuti anga hêi reng chuan ni 18 chhungin lei pum pui thla a la hman. Hetia chhim leh hmar dung zui zâwna a thlawh laia thla a lakte hi boruakah a rawn thawn a, lei lamah a khawlpui hmangin an lo dawng a, an lo 'record' ta thin a ni.

Heng ram thlate hi computer hmangin chipchiar takin a zir theih bakah thlajak pangngai anga an siam chhuah pawh leilung leh ram chanchin zir nan a tangkai hle.



IRS-1A

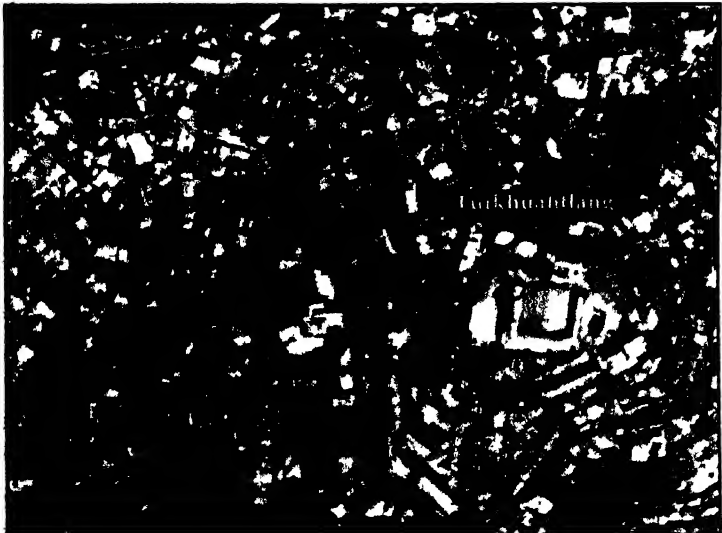
Kum 1985 khan France sorkar pawhin SPOT thla lem a kap chhuak a; Russia leh Japan pawhin anmanai pualin thla lem an nei tawh baw. Kum 1988 March ni 17 khan India pawhin ama kut chhuak ngei IRS-1A

(Indian Remote Sensing Satellite-1A) the Russia ram atangin a kap chhuak ve thei ta. Thicham ram hausakna chhuti thla lem kap chhuak a ngawh khawv lah pangana a lo ni ve ta. Kum 1994 October ni 15 an thla IRS thla lem dang IRS P2 phei chr am a siam Polar Satellite Launch Vehicle (PSLV-D2) hmangin a kap chhuak ve thei ta reng

mai. India hian kum 2012 thlengin IRS thla lem sâwm chuang lai a kah chhuah tawh bâkah Cartosat, Oceansat, leh RISAT te pawh a kâp chhuak tawh bawk.

Kum 1990, January ni 22 khan SPOT-2 thla lem pawh kah chhuahna khâwl Ariane 4 launch vehicle hmangin France rama Kowrov hmun atangin an kâp chhuak leh a, kum 1991, May thla khan European Space Agency Remote Sensing Satellite ERS-1 pawh kah chhuah a ni leh ta.

Kum 1999 September ni 24 khan US Company pakhat Lockheed Martin chuan thla lem ram leilung thla chiang taka la thei Ikonos a kâp chhuak a, chumi hnuah chuan US Company dang Digital Globe chuan kum 2001



Quickbird thlalak, Aizawl(part)

October ni 18 khan thla lem Quick Bird kâp chhuakin, a hnu kum 2007 September ni 18-ah thla lem dang World View chu a kâp chhuak leh bawk. Heng thla lem thlalâk te hi khawvêl hmun tinah an hmang tangkai hle.

Kum 1976, May thla khan thla lem Lageos (Laser Geodynamic Satellite) chu lei atanga km. 6000 laia sâng atanga lei hêl turin dah a ni a. A awmna a sân êm avangin lei tuamtu boruakin a tibuai pha dawn lo va, a rei lo berah pawh kum maktaduai riat zet chu lei hêl thei tura beisei a ni. He thla lem hmang hian khawmual zâwi zâwia a tawlh luh dân a chhui theih dawn a, centimetre tlem têa khawmual tawlh hlek emaw limghing avanga khawi lai ram che hlek pawh a chhinchhiah thei. Rei takawm tura tih a nih avangin khawvêl a la awm zêl chuan nakin huah mîte n he thla lem atang hian leilung leh khawmual chet dân tam tak an rawn zir thei ngei ang.

Ni leh arai dang chanchin zirna thl: lemte

Thla lemte hi kan lei tuamtu boruak chunglam zir nan an tangkai hle. Hti ang sân hian Explorer thla lem te, GGO (Orbiting Geophysical Observatory) te an kâp chhuak a. Lei tuamtu boruak chung atang khi chuan vâa a thiang bik êm êm a chu bâkah, leia lo thiang lo êng zung-zung theihnat ultra violet ray leh X-ray te a zir theih bawh a, heng sân hian thla lemte hi an chhawr tangkai hle.

Ni klian êng leh lumna min pein chakna min pe a, khawvêl thl nung zawng zawng te tan nuna bul a ni a; chu vangin a chanchin tam thei ang ber hriat a chakawm

bâkah a tul ve rêng rêng a. Nî chanchin zirna bik atân kum 1975 chung khan OSO (Orbiting Solar Observatory) thla lem pariat lai an kâp chhuak a, kum 1980 khan Solar Maximum thla lem an kâp chhuak leh bawk.

Thla lem hmanga an thil hmuh chhuah zînga paximawh tak pakhat chu hmun dang atanga X-ray lo kai a ni a. X-ray tichhuak tur hian boruak (gas) sa tak, a sa zâwng degree maktaduai tam tak a ngai a; chu vangin X-ray tichhuaktute chu arsi sa tak emaw kan awmna arsi bâwr piah lam hla taka arsi bâwr dangte pawh an ni thei a. Kum 1970 khan SAS-1 (Small Astronomy Satellite), Uhuru an tih bawk chu an kâp chhuak a, a hnuah SAS-2 leh SAS-3 pawh an kâp chhuak leh bawk a. Heng thla lemte hian X-ray pe chhuaktu 160 zet mai an hmu chhuak thei a. Heng bâkah hian thla lem dang, Astronomical Neitherland Satellite te, British Ariel V-te leh HEAO-1 (High Energy Astronomy Observatory) te pawh kah chhuah niin X-ray pe chhuaktu 100 zet chu hmuh chhuah belh a ni leh ta bawk.

X-ray pe chhuaktute hi ngun taka an zir hnuin hmun thuma thena hmun hnihte chu arsi muk tak leh hîpna chak tak mai, tûn hmaa arsi lian tak ni thin lo sâwng tê ta 'neutron star' an ni a. Arsi thenkhat chu an lo muk êm êm a, an hîpna a lo chak tâk lutuk avangin anmahni atanga êng lo chhuak tur pawh chhuak thei lovin an hîp bet tlat a, chuvang chuan an hmu theih lo va; amaherawhchu, an hîpna chak tak avanga boruak an hîp luh kang atanga X-ray lo chhuak atang chuan a awm ngei a ni tih an hre thei

si a. Hetlang arsi hi 'black hole' an vuah a. Black hole an hmuh chhuah hmasa ber chu Cygnus X-1 a ni.



Cygnus X-1

Eng zung zâm chi dang Gamma rays leh Infrared zirna atân thla lem dang eng emaw zât an kâp chhuak bawk. Kum 1975-a an kah chhuah European COS B Satellite chu Gamma rays zirna atân liau liaua tih a ni a. Kum 1983-a America, UK leh Netherlands tangrualin an kah chhuah IRAS (infra-Red Astronomy Satellite) chuan arsi sa lutuk lam ni lovin thil sa vak lo atanga eng lo kal a lo zir thung a. He thla lem hian arsi Vega hual vêla planet insiam tan mek chu a hmu chhuak a; kan solar system-a simeikhu eng emaw zât a hmu chhuak bawk.

Kum 1990 April thla khan entlang 'Hubble Space Telescope pawn space shuttle hmangin an kâp chhuak a. Entlang a ni hian thla lem dang ang bawkin kan lei a hêl ve reng a, Saturn leh Pluto chanchin te, van lam chanchin eng eng emaw dang zâwkin min hêl thei ta bawk. Kum 2012 July ni 19 pawh khan Hubble Space Telescope hmang hian, tûn hmaw planet zinga chhiar tel thin, dwarf

planet kan tih tak Plato hêltu thla pangana an la hmuh
chhuah bella cheu mai!



Hubble Space Telescope

Kum 2010 February ni 11 khan NASA chuan ni
chanchin zir turin thla lem Solar Dynamic Observatory
(SDO) a kâp chhuak a. He thla lem hian kum 5 chhung
chu ni chanchin a zir dawn a ni.



Solar Dynamic Observatory

Enthlatu leh ram vênhimna thla lem

Vân sâng a thla lem an dah tam tak chu mahni ram vênhimna leh mi ram enthlak rân hman an ni hlawm a. America thla lem Discover-ho kha hetiang atâna hman tura rushman hi an ni a. Discover thla lemte hian hmêhnate indo thlawm a, missile an bunna hmunte an chhui thei a, an tângkai thei. Hetiang thla lem bakah hian Samos (Satellite and Missile Observation System) pawh kah chhuah a ni leh a. Kum 1961 hmuah erawh kha chuan enthlatu thla lemte hi an puang zâr ta lo hle; chu vangin America leh Russia enthlatu thla lem kah chhuahte leh tûn hnua ram dangin an kah chhuah vete chanchin kimchang tak hriat a har hle.

Vân sâng atanga enthlatu thla lemte'n enthlakna hna an thawh reng avangin khawvêl ram hrang hrangte chuan an ralthuam chhêknate leh sipai inkulhna hmunte an inhriatsak tawn thawkhat hle a; chu vangin an inhlautawnin, khawvêl a tirâlmuang zawmah âwm e.

Kum 1971 America thla lem kah chhuah pakhat hming chu 'Big Bird' an vuah a. He thla lem chanchin chiang tak hi hriat a ni lo nain a thlawkna ken chuan lei lama centimetre tîemte huam chung pawh hi fiah takin a la thei rân hriat a ni a; chu chuan hmêlna ram chanchin leh sipai chet vâi dân chu a hre chiang thei khawp ang. Russia thla lem 'hunter-killer' pawh a hlauhawm kher mai. He thla lem hman tam dang bulah thlawkin awisam takin a thei thei hman hman thei a, hla deuh ami pawh laser hmangin a kâp chhe vek thei bawk. Tûnah phehi chuan heng aia changkâng tak tak hi an nei nual tawh ngei ang.

7

HMASÂWNNA THAR

Mihringten thla hial an han thlen theih hnuah leh hlawhtling taka vân sâng aṭanga lei an hêl theih tak hnuah chuan ngaihtuahna thar a lo piang chhuak ve zêl a. Vân lam leh lei lam chanchin zir mai bâkah vân sâng boruakah thil zir leh enchhinna eng eng emaw neih an duh ta a. Tûn hma lama boruak lawng an hman rêng rêng kha a hman nawn leh theih lo va, a dang siam leh zêl a ngai a; hei vang hian a sênsô a nasa êm êm a, ram rethei deuh tân phei chuan thiamnain tlin mah se tum ve ena en chi pawh a ni lo hial a. Heti lama tân an lâkna leh hmasâwnna thenkhat i han thlîr thuak thuak teh ang.

Vânkhawhthei (Space Shuttle)

America chuan boruak lawng hman nawn leh theih siam chhuak tur chuan hma a la ṭan ta a. He boruak lawng hmingah hian ‘Space Shuttle’ an vuah a. Mizo ṭawng chuan ‘Vânkhawhthei’ kan ti a. Space Shuttle hi thil thar tak angin lang mah se a lo ngaihtuah chhuaktu tak chu Austria mi Eugen Sanger-a a ni a; kum 1930 bâwr vêl daih tawh khan hetiang hmanga mihringin vân sâng aṭanga lei an hêl dân tur a lo hmu lâwk tawh tlat mai.

America-in Space Shuttle siam tuma tan a lâk tak takna chu kum 1969 kha a ni a, Richard Nixon-a President nih hun lai kha a ni a. Atirah chuan chhâwng hnih neia siam tum a ni a. An ruahman dân chuan heng chhâwng hnihahte hian a khalhtu an awm ve ve ang a, a chhâwng hnuai zawk chuan a chhâwng chung zawk chu vân sângah a han dah hnuah lei lâmah a lo kîr ang a, a chhâwng chung zawk Orbiter chuan lei hêlin, an duh hun hunah leiah an rawn tum leh mai dawn a ni. Amaherawhchu, chuti ang han siam tur chuan a buaithlak bâkah sum sên a tam lutuk dawn avangin a chhâwng hnuai zawk atân chuan mihring chuan lohna rocket pângngai hman an titlu ta zawk a.

Orbiter hi a sei zâwng ft 122.5 a ni a, a thla pharh nen a hlai zâwng ft 78 a ni thung. A hma lâmah hian mi pasarih an chuang thei a, chaw chhumna te, inthiarnate leh mutnate a awm vek bawk. Orbiter-ah hian thla lem leh thil dang phurhna tura siam a sei zâwng ft 60 leh a vang zâwng ft 15 a awm bawk a; chumi chhungah chuan thil ton 29 laia rit a phur thei a ni. Hemi hmang hian thla lemte phurin vân sâng boruakah a han dah thei a, thla lem hman tlâk tawh lohte leh siam that ngaite pawh han lain leiah a rawn phur thla thei bawk. Orbiter hi vawi khat mai ni lovin vawi za lai hman nawn theih tura ruahman a ni a. Thlawhtheihna pângngai kan chuang ang mai hian vân sâng boruakah han thlâwkin leiah an lo kîr leh thei a ni. Heng zâwng zâwng avang hian vân sâng zin man pawh zaa sawmkua lain a hman thei ta a; vân lama hmasâwnna kawngah rahbi pawimawh tak a lo awm ta a ni.



Space Shuttle hmasa ber Columbia chu kum 1981 April ni 12 khan Cape Carnaveral atāngin hlawhtling takin an kâp chhuak ta a, an kah chhuah atānga second 122 hnuah, km. 46-a sânga a awmin a *booster rocket*

pahnhte chu an thlingthlaw a, parachute hmangin hman nawn leh theih turin tuifiristah an tia a. Km. 116-a sang a thlenin rocket khawipui pawh chu thlawrin boruakah a kangral ve a; Ti chuan, lei hel tur orbiter chuan lei a hel ta pap pap a, vawi 36 lai van sang atanga lei a hel hnuin April ni 14-ah thlawhtheihna ang mailin leiah a lo tum leh ta a. A tir takah chuan mi pasarih chuang tura tih a ni nain hemi tum hi chuan mi pali an chuang a. He space shuttle hi kum 1981 November ni 12-ah te, kum 1982 March ni 22, June ni 27 leh November ni 11-ah te an kap chhuak leh bawk.

America chuan kum 1983 April ni 4-ah Space Shuttle Challenger 4 kap chhuakin, hemi kum vek June ni 18 khan Challenger 5 a kap chhuak leh a. Chuta chuang Sally Ride-i chu America hmeichhe zinga space shuttle hmanga van sang zin hmasa ber a lo ni a. Kum 1983, August ni 30-a Challenger 5-a chuang Guion S Blueford-a chu America mihang zinga vankhawhthei hmanga van sang zin hmasa ber a lo ni ve leh a. Challenger hnuah hian space shuttle dang Discovery leh Atlantis pawh kah chhuah an ni leh a. Atlantis hi kum 1985 October ni 3 khan kah chhuah rin America thlawhna sipai pawl inbiakpawhna bik thla leh a. Chuan dangin an thibui theih loh tura tha van sangin lei hel turin a han dah a. Kum 1984 April thla khan space shuttle hmangin thla lem, 'Solar Max' chhe tawh an han siam tha a. Hemi siam tha tur hian space shuttle atanga chhuakin darkar 6 leh minute 44 chung an han thawk a. Kum 1984 November thla khan space

shuttle hmang bawk hian thla lem pahnih Palpa B-2 leh Wester-6 khâwl tha lo lai hlawhtling takin an han siamtha leh bawk.

Kum 1986 January ni 29 khan America vân lam programme-ah vânduaina rapthlâk tak a lo thleng tlat mai! Space Shuttle Challenger chu an kah chhuah atanga second 75 lekah a puak darh ta vek mai a, a hrilhhaithlak kher mai. A chhunga chuang mi pasarih an boral vek a; a thi zînga pakhat pheih chu zirtirtu hmeichhia Meauliff-i a ni nghe nghe. He thil râpthlak tak lo thleng hi America chuan pawl a ti tak zet a. Kum 25 chhung zet vân sâng lama hmasâwnna kawng thui tak an lo zawh tawh hnuaa leh he space shuttle hmanga vawl 24 lai an zin tawh hnuaa suangtuah lâwk loh ang takin he thil hi a lo thleng ta a ni. He vânduaina rapthlak taka thi ta mi pasarihte hi America chuan mi huaisen, ram tâna nun peah a puang a. He thil thleng avang hian NASA-a he space shuttle kah chhuahnaa an hotu lu ber Mr. Jessi Moore-a chu kum 14 lai vân sâng thlâwk mi lo ni tawh Vice Admiril Richard Truly-a an thlaktîr ta a ni.

America Space Shuttle Challenger thlak turin Space Shuttle Endeavour an siam leh ta a, May 1991 khan hlawhtling takin an kâp chhuak leh a. A hnuaa pawh space shuttle hrang hrangte hi vawl eng emaw zât an kâp chhuak leh bawk. Space Shuttle-te hi vân sâng boruaka mihring ngei chuanga thil han zir nân te, thla lem leh entlang han dah nân te, space station dinna tur châk khai phurh choh nân te a tângkai êm êm a; thlawhtheihna ang

maia lei hêltu orbiter hi hman nawn zêl theih a nih avangin a sênso pawh a ziaawm hle.

Thil a kal tluan viau lai pawh hian vânduaina hi a lo thleng leh zauh thin. Challenger-in chhiatna a tawh atanga kum 17 hnuaah vânduaina a lo thleng leh tlat mai. Space Shuttle Columbia chu January ni 16 2003 khan a wawi 28-na atân kah chhuaha ni a. He space shuttle-a chuang mi pasarih zîngah hian India mi America-a awm ta, Kalpana Chawla pawh a tel ve a. Ani hi Aerospace Engineer a ni a. Columbia hian tluang takin ni 16 chhung lai lei a hêl a, a chhunga chuangte pawhin an thil zir tur hrang hrangte tluang takin an zirin an ti thei a. Amaherawhchu vânduai thlak takin a rawn kîr lamah lei tuamtu boruaka a lo luhin February ni 1, 2003 khan a keh darh ta hlauh mai a. America rama Texas leh Louisiana vêlah a tla darh ta a, a chhunga chuang mi pasarih pawh an thi vek a.



Columbia vânduaina avang hian space shuttle programme pawh an chawltîr ta rih a. Vânduaina an tawh chhan te chhuiin him zawka siam dân te an ngaihtuah bawk a. Kum hnih hnu July ni 26, 2005 khan Space Shuttle Discovery an kâp chhuak leh a. Tluang takin a chhunga chuangte pawhin vân sângah hna an han thawk thei a. Khaw that tawh loh avangin a lo kîr hun tur ni hniha an tihtlai hnuah August ni 6, 2005 khan him takin leiah an lo kîr leh ta a.

Space shuttle hi a tîr atangin vawi 135 an kâp chhuaka, vân lam chanchin zirna leh vân sânga thil hrang hrang zir nân a tangkai hle. Tûm hnih vânduaina tâwkin mi 14-in nunna an chan thung. Kum 2011 July ni 8 khan Atlantis an kâp chhuak leh a, hnuhnung ber a ni ta rih a ni. Ti chuan kum 2011 August ni 31 atang khan space shuttle programme chu tihtâwp a ni ta a ni.

Space shuttle hi vân sânga thil zir chianna space laboratory, Spacelab an tih mai phurtu atân an hman tangkai hle bawk. Kum 1983 November ni 28 khan European Agency kut chhuak Spacelab chu America chuan a Space shuttle hmangin a kâp chhuak a. He spacelab-ah hian America mite bâkah West German Scientist Ulf Merbold-a a tel ve nghe nghe. Enchhinna chi hrang 70 zet an han ti a; leia chawhpawlh theih loh thil chi hrang hrang chawhpawlh in thil thar an siam chhuak a, an enchhinna kawng hrang hrang a hlawhtling hle. He Spacelab hi vân sâng chawlhmun dangte ang lo takin Space shuttle-in a phur a; an thawhchhuah hmasak ber tûm chuan vân sângah ni 10 chung lai an han thang a.

Kum 1983 November ni 28 ațanga kum 1998 April thla tieng khan vawi 25 lai spacelab hi space shuttle-in a phur a, scientist-ten lei h̄pna t̄l̄mna hmunah thil tam tak an han zir thei a ni.

V̄n s̄nga thil zirna hmun 'Skylab'

Space shuttle hmanga v̄n s̄nga thil han zir thei ta chu a lawmawm hle nain duh thu a la s̄m tawk chiah lo va; chu vangin, rei deuh zawk an cham theih n̄n v̄n s̄ng thil zirna hmun 'space station' din dân kawng a ngaihtuah bawk a. Chuti anga thil zirna hmun tur a siam hmasa ber chu Skylab a ni a; Saturn V rocket chh̄awng thumna tihdanglam a ni a. He Skylab hi a rit hle; ton 75 laia rit a ni a, a sei z̄awng pawh ft 82 a tling hial a. A lian lai hawlhtlangin ft 21.5 a ni a, a chhunga chuangte hnathawhna pind̄n leh ch̄enna pind̄n a awm hrang a, boruak lawng dang nena inzawm thei tura siam a ni bawk.



Skylab

Skylab-ah hian thil zirna hmanrua chi hrang tam tak a awm a, lei lam thlirna leh nî thlirna entlang tha tak a awm bawk.

Kum 1973, May ni 14 khan Skylab pakhatna chu Saturn V rocket hmanga kahchhuah a ni ta a. Chu rocket chhâwng chung ber chu Skylab chu a ni nghal mai a. Ti chuan a chhâwng khatna leh a chhâwng hnihnate chuan a chhâwng thumna Skylab chu lei hêl turin vân sângah, a hêl kawng (orbit)-ah a han nawr chho ta a; amaherawhchu minute khat lek hnuah nî sa laka vengtu kâwr chu a thlawn ta mai a, chu bâkah nî êng chakna lo dawngtu (solar panel) pakhat chu a thlawn tel lehngal a, a buaithlak hle. Ti chuan, a kâwr a chhiat avang leh sorlar panel pakhat a thlawn avang chuan a chhung pawh a sâin a chhungah kâwlphehtha pawh dukthusam a awm thei ta lo va. Hemi avang hian a tûk maia skylab han tlawh tura mihring thawm an tum pawh chu thulhin, ni 11 hnu daihah Apollo boruak lawng hmangin Charles Conrad-a leh a thiante pahnih chuan an han thleng ta a. An hmanraw kente chuan solar panel siam tha tur leh a chhung sa lutuk tidai tur chuan pawn lam atangin theih tâwp an chhuah ta a. Conrad-a te, Paul Weitz-a leh Joseph-ate chuan fimkhur takin skylab chhung chu an lût ta a. A chhung chu a lum hle a, nî sain a em sat lutuk loh nân eng emaw ti tala khuh dân an dap ta a. An khuh zawh chuan electric lam siam that hna chu an thawk leh ta char char a, harsa tak leh hlauhawm tak kârah engtin tin emaw an siam tha thei ta hrâm a, siamthat hna a thawh zawh chuan an thaw huai a, thlamuang takin an awm ta a.

Skylab hi tûn hmaa boruak lawng an siam tawh zawng zawng aiin a changkâng a, a chuan pawh a hahdamthlâk hle. Mut bu (sleeping bag)-ah an mu a, a chhungah hian rihna an hloh vek avangin khum hran a ngai lo va, a chhung boruakah chuan an lăng mai a. Chaw chi hrang hrang an ei a, an duh leh an chawhpawlh a, an chhuang lum a, an duh leh an tidai a. An zun leh êkte pawh tlâkna lam tur chuang a awm loh avangin thli hmangin an paih chhuak mai a.



Skylab chhung

Ni 28 chhung zet an chām chhungin rihna hlohna hmuna an awm avangin an taksa chhungah nghawng a neih leh neih loh ngun takin an zir a. An lûng te, tihrâwlte leh an ruhte an zin hma ai chuan a chak kovin an thisenah pawh danglamna a awm a. A bik takin an zînga doctor awm Kerwin-a chuan an taksa danglam dân hi a zir ngawrh hle. Skylab-a an cham chhung hian an tihrâwl tihchak nân thîrsakawr anga siam hmangin an insawizawi

a. Rei fê an châm hnuah lei lamah an lo kîr leh a. Leia an lo kîr hnuah, vân sâng an han awm avanga inchhuanlam tur an nei lêm lo va.

A tum hnihnaah chuan Alan Bean-a, Jack Lousman-a leh Owen Garriott-a te chu an han zin ve leh a. Anni hian vân sâng natna (space sickness) vein an lu a hai a; nimahsela, rei lo teah a reh leh ta hlauh a. Ti chuan, Garriott-a leh Lousman-a phei chu dârkâr ruk leh a chanve chhung zet skylab pawnah chuan chhuakin nî thlâ latu thlalâkna *roll film* thar an va thun a, nû sâ avanga skylab chu a sat lutuk loh nân a hmaa an khuhna aia hlaiin an khuh ta a; a hma aiin a dai nuam ta a.

Enchhinna mak tak mai pakhat an tih chu America-a high school zirlai pakhatin a rawt a ni tlat mai. Maimawm pahnih an keng a, an rîl zam dân an en a. Maimawm pakhatna 'Arabella' chuan a tirah chuan a rîl zam a harsat hle a; mahse rei lote hnuah chuan eng tin tin emaw a zam thei ta hrâm a. Maimawm pahnihna 'Anita' thung chuan rihna hlohna hmun chu a lo nel hman tawh a, harsatna nei lovin a rîl chu tha takin a zam thei ta mai a.

A hmaa Skylab-a mihring chuangte khan ni 40 chhung zet rihna hlohna hmunah chuan harsatna nei lovin an awm thiam tawh a. Tûn tuma mite phei hi chuan a hmaa zinte aiin insawizawina tam zawk an nei a, hna pawh an thawk nasa hle. Ni 59 chhung zet an châm chhunga an hlawhtlinna avang hian a hnua zin lehte phei chu ni 84 lai châm tura tih an ni ta a.

A tum thumnaah chuan Gerald Carr-a, Edward Gibson-a leh William Poque-a te an thawn ve leh a. Anniho hi an vân sâng vawikhat zinna a nih avangin a tîrah chuan an lu a haiin an luakte a chhuak a; amaherawhchu, mi dang ang bawkin an awm rei deuh hnu chuan chung an harsatnate chu a kiang ve leh ta mai a. Ni ruk an cham hnu chuan Gibson-a leh Poque-ate chu a chhung ata chhuakin nî thlîrna entlangah chuan film thar an va thûn ve leh a, *radar antenna* pawh an va siam tha bawk a. Hetia skylab-a an cham chhung hian simeikhu Kohoutek an hmu a, chu chuan an hlawhtlinna a tizual a. Ti chuan, February ni 8, 1974-ah hlawhtling takin lei lamah an lo kîr ve leh ta a.

Skylab-ah hian enchhinna tam tak an ti a, a tangkai hle. Lei hîpna avanga kan chawhpawlh theih loh tui leh hriakte hi awlsam takin skylab chhungah chuan a chawhpawlh theih tlat mai a, chu bâkah thil dang tam tak leia siam theih loh thil tangkai leh tha zawk a siam theih tlat bawk. Heng an thil zir zawng zawng atang hian vân sânga thil siamna hmun pui din a nih dân tur leh a tangkai dân tur thil tam tak an hre chhuak chho zêl a.

Kum 1973 leh 1974 chhung khan Skylab-ah hian Apollo Command Module hmangin mihring tum thum an inthawn a. Space Shuttle programme avangin tlêma ngaihtah a ni chho ta a. Han chei thata, la hman zêl an rilruk lain kum 1976 khan lei a hêlna lo hniam thlain lei tuamtu boruakah a keh darh ta a, a keh them thenkhat

chu Australia khaw thlang lama te pawh a tla a, Ti chuan Skylab programme pawh chu a lo tâwp ta a ni.

Vân sâng intawhna

America leh Russia chuan vân sâng boruakah an boruak lawng inzawmtîra, intawh dân kawng an dap a. Heti anga intawhna hi tún hmaa la awm ngai lo a nih avangin a pawimawh hle a; an ram pahnih inkâra inlaichîna tha zawk leh vân sâng lama thawhhona tha zawk thlen theitu pawh a nih ngei a beisei awm hle a. An boruak lawng siam dân a inan loh avangin vân sâng inzawm tur chuan eng eng emaw tihdanglam hlek hlek a ngai a. A chhunga chuangte pawh vân sâng thil tiho tur an nih avangin tawng an inhriat tawn a ngai a; chu vangin, tawngte an zir hovin thil tul dang eng eng emaw an zir lâwk diam a.

Kum 1975, July thla chuan Apollo boruak lawng, mi pathum phur chu Cape Canaveral aţangin kah chhuah a ni ta a, Russia boruak lawng Soyuz pawh Russia ram aţanga kah chhuah niin vân sângah an inzawm ta a. Ti chuan, boruak lawnga chuangte chu intlawn tawnin ni hnih chhung zet an awm ho va, chumi hnua chuan inthenin an boruak lawng ve ve hmang chuan lei lamah an lo kîr thla leh ta a.

Russia vân sâng thil zirna hmun 'Salyut'

America-in vân sâng chawlhmun a buatsaih Skylab ang chi bawh hi Russia chuan a nei ve a, a hmingah

'Salyut' an vuah a. Skylab nen an inang viau nain a tê zawk a, a sei zâwng ft 39.3 a ni a, a lian lai ber pawh hawlhtlangin ft 13 a ni a. Skylab ang bawkin Salyut hmang hian vân sânga rihna hlohna hmuna mihringte taksa awm dân te, thil siam dânte an zir a; lei lam leh vân lam chanchin zirna atân pawh an hmang tangkai hle.



Salyut

America-in Skylab a kah chhuah hma kum hnih, kum 1971, April thla khan Russia chuan Salyut 1 a kâp chhuak a; amaherawhchu, he chawlhbmuna châwl tura boruak lawng an kah chhuah nen chuan an inzawm thei ta tlat lo mai a. A hnuah chuan mi pathum chuanna boruak lawng dang Soyuz II chu an thawm leh ta a; hemi tum hi chuan an han zawm thei ta a. Ni 23 lai Salyut 1-ah chuan an han chām a. Amaherawhchu, an lo kîr leh lamah rin loh takin vânduaina râpthlak tak a thleng ta tlat mai! Leia an lo kîr

leh chu hlim taka lo hmuakin a chuanna boruak lawng chu an han hawn nâk chuan an pathum chuan an lo thi vek mai a, a hrilhhaithlak hle. Ti chuan, an thih chhan hi ngun takin an chhui nghal a. A tîrah chuan, vân sânga an cham rei avangin an nunnain a tlin lo niin an ngai ber a Nimahsela, chîk zawka an chhui hnuah chuan an chuanna boruak lawng chhunga boruak nemna (pressure) chu lei lama an lo kîr laiin a chhe ta tlat mai a, chuvang chuan an thi ta niin an ngai.

Soyuz boruak lawngah bawk hian Komarov-a khan vânduaina a lo tâwk tawh a ni a, hetia mi pathum thihna râpthlak tak a lo thlen leh tâk avang hian ngun zâwkin an siâm tha ta a, mi pathum ni lovin mi pahni h zêl chuang tawh tura tih a ni ta nghe nghe.

Kum 1973-a vân sâng chawlhmun Salyut 2 an kah chhuah pawh vân sânga lei a hêl tawh hnuin a keh chhe leh hlauh mai a. A kum leh July 1974-ah chuan Salyut 3 a kâp chhuak leh ta a; hemi tum hi chuan an hlawhtling ve ta a. Salyut 3-a chuang Pavêl Popovich-a leh Yuri Artyakhin-ate chu Russia mite zînga vân sâng chawlhmunna tluang taka zin hmasa ber an lo ni ta a. Salyut 3 hi ram vênhimnâ leh ram enthlâkna lam atâna hman ni deuh berin a lang. Hetiang bawk hian a hnua an kah chhuah Salyut 5 pawh hman a ni leh a; mihring an chuan tawh loh hnu pawhin lei lam atangin an enkawl a, enthlâkna hna a chhunzawm zêl nia hriat a ni. Salyut 1, Salyut 4 leh Salyut 6 te erawh chu thil zirna atân liau liau hman a ni thung.

Ram dang miten 'Salyut' an tlawh ve

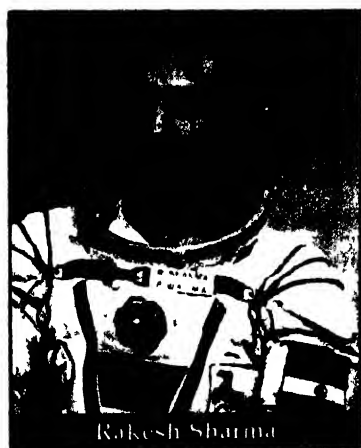
Kum 1975 khan Soyuz 17 boruak lawnga chuangte chuan Salyut 4 an han tlawh a, thla khat chhung zet an han chām a. Hemi kum vèk hian Soyuz 18-a chuang Pyotr Klimuk-a leh Vitaly Sevartyanov-ate chuan Salyut 4 hi an han tlawh ve leh a, ni 64 chhung zet an han cham ve leh a. Kum 1977 December thla khan Yuri Romanenko-a leh Georgi Grechko-ate chu Soyuz 26-a chuangin Salyut 6 an han tlawh a, ni 96 chhung zet an han cham a. Hetia an chām chhung hian lei lam atāngin mi dangin tum hnih zet an han tlawh a; thil mamawh eng eng emaw an han dah a. Tum hnihnaa tlawhtute zīngah hian Czechoslovakia mi Vladimir Remek-a chu tel vein Europe ram atanga vân sānga zin hmasa ber a lo ni ta a.

Kum 1978 June thla khan Vladimir Kovalyonok-a leh Alexander Ivanchenkov-ate pawh ni 140 zet chām turin an thawh ve leh ta a. Hetia an chām chhunga anmahni tlawhtute zīngah Europe mi pahnih : Poland mi Miroslaw Hermaszeviski-a leh East German mi Sigmund Jahn-ate an tel ve leh a, enchhinna hna tam tak an han thawk a, Kovalyonok-ate thian dun chu thla nga chhung zet an chām hnuah lei lamah an lo kīr leh ta a. Doktor-ten an taksa awmdān ngun taka an zir hnuah that lohna an hmu lo va, hun rei zawk pawh vân sāngah mihringte kan nung thei ngei a ni tih an hre chiang ta a.

Kum 1980 khan mi dang pahnih Leonid Popov-a leh Valery Ryumin-ate chu ni 185 lai vân sāng chawlhmun Salyut 6-ah an han chām leh a. Hetia an

chām chhunga anmahni han tlawhtute zingah hian Hungaria mi te, Vietnam mi te, Cuba mi te, Mongolia rama mite leh Rumania mite an tel ve leh a. Kum 1980 khan boruak lawng Soyuz pawh tihdanglam niin a hmingah Soyuz T vuah a ni ta a, mi pathum an chuang thei ta baw k a.

Kum 1982 khan Salyut 6 thlāk turin Salyut 7 chu kah chhuah a ni leh a; a hmaa mite aiin changkâng zawka siam a ni a. Heta chuang Valentin Lebedev-a leh Anatoly Beravox-ate chu he vân sâng chawlhmunah hian thil zirin ni 211 lai an han thang a, December ni 10, 1982 khan him takin an lo kîr leh a. A hma a vân sâng zin tawhte aiin an chām rei hle. Svetlana Savitskaya-i pawhin he chawlhmun hi Soyuz T-7 hmangin kum 1982 August thla khan an han tlawh ve a; Russia hmeichhe zînga vân sâng zin pahnihna a lo ni ve leh ta a.



Kum 1984 April ni 3 khan India mi Sqn Ldr. Rakesh Sharma-a pawh Russia mi pahnih nen boruak lawng Soyuz T-11 hmangin Salyut 7 hi an han tlawh ve ta a; India mi vân sâng zin hmasa ber a lo ni ta a ni. Vân sâng chawlhmunna a awm lai hian, khatih laia India Prime Minister Pi Indira Gandhi nen

minute 10 chhung zet an inbia a. Sharma hian Pi Indira Gandhi zawhna chhângin, “Vân sâng aṭang chuan India ram hi a lo mawi ber mai,” tih a sawi nghe nghe. Ni 8 chhung zet an châm hnuin him takin an lo kîr leh ta a.

Salyut 7 hi kum 8 leh thla 10 chhungin borual lawng hmangin vawi sâwm lai tlawh a ni a. Kum 1985 February ni 12 khan mihring tlawhtu an awm loh laiin khâwl hmanga biak pawh theih lohvin a awm ta thut a, a khâwl zawng zawngin hna a thawk lo tih hriat a ni ta a. Ti chuan, hemi kum vêk June ni 6-ah Russia chuan a boruak lawng Soyuz T-B chu kâp chhuakin Salyut 7 siam tha tur chuan Vladimir Dzhanibekov-a leh Georgi Crechko chu a han tîr a, vânehithlak takin an han siam tha thei hlah mai a; vân sâng boruaka thil kah chhuah siam that chhinchhiah tlak leh mi beng verh ber pâwl a ni âwm e.

Hemi hnu hian Soyuz T-15 hmangin mi pahnih Leonid Kizim-a leh Vladimir Solovyov-a te tîrh an ni leh a. Anni hian March ni 18, 1986-ah Russia vân sâng chawlh hmun Mir an siam mek chu tlawh hmasain, 51 dawn lai an châm hnuin May ni 6-ah Mir chhuahsanin km 2500 zeta hlaa awm Salyut 7 chu dârkâr 29 chhungin an thleng thei a. Salyut 7-a hmanraw 20 zet thlawh in Mir station-ah an hâwn a, a vaiin kg 400 vêl zeta rit a ni a. Mir station-ah hian enchhinna eng eng emaw an tih hnuin lei lamah an lo kîr ve leh a.

Ti chuan, Salyut 7 chu hnuchhawh in Mir station lamah rilru sâwr bing a lo ni ta a. Kum 1991 February ni

7 a lo ni a, Salyut 7 chu lei a hêlna atanga lak thlak a lo ni ta a ni

Vân sâng chawlhmun 'Mir'

Kum 1986 February ni 20 khan Russia chuan vân sâng chawlhmun thar 'Mir' chu lei hêl turin a han dah leh a. He chawlhmunah hian a rualin boruak lawng paruk lai an tum thei a, a hmaa mite ai chuan a hrawl hle. A nihna takah chuan Mir hi thla lem kan tih chi tho kha a ni a, International Space Station din a nih hma chuan thla lem zingah a lian ber kan ti thei ang.



Mir

A hmaa kan sawi tawh angin kum 1986 March ni 13-ah Russia mi pahnihte chu Soyuz T-15-a chuangin a tûk ni 14-ah Mir-ah hian an han tum a. Hetia an tum lai hi T.V. hmangin mi tam takin hmuhdawm ti takin an lo thlir

thup a. Soyuz-a chuang Leonid Kizim-a leh a thianpa Vlanmir Solvyov-ate chuan enchhinna tam tak neiin chawlhmun dangte pawh an pakai a, kum 1982 April thlaa an din tawh Salyut 7 pawh an va tlawh ve a. Ni 50 lai an thang hnuin hlawhtling takin an lo kîr leh a. Russia mi bawk Yuri Romanenko-a pawh Mir chawlhmunah hian chawlhkar 35 lai a châm hnuin kum 1987 October ni 2 khan him takin leiah a lo kîr leh a; a hmaa mite khûmin a châm rei hle a. Mir-a cham rei ber chu Valeri Polyakova a ni a; ni 437 leh dârkâr 18 lai a châm a, mihring zînga vân sâng boruaka châm rei ber a ni.

Mir hi vân sânga hun rei zawk thil zir theihna atâna siam a nih angin vân sâng boruaka lei hîpna tlêmna hmuna leia thil nungte leh mihring nunphung zir nân te, vân lam chanchin leh khaw awm dân zîr nân te hman a ni a, a tangkai hle.

Kum 15 chung zet vân sânga atanga lei a hêl chung hian an hmang rim hle; kum 12 leh thla 6 chung chu mihringin an luah a ni. Russia ta ni mah se, Russia hian ram dang tân a hawng zau hle a, America phei chuan a hmang rim hle. Kum 15 chung hian mi 104 laiin an han tlawh a. Russia boruak lawng Soyuz hmangin vawi 39 an tlawh, America Space Shuttle hmangin vawi 9 a han tlawh bawk. Russia leh America mite bâkah ram dang mi 18 laiin Mir hi an tlawh ve a ni.

Kum 2000 April ni 4 khan Soyuz TM-30 boruak lawng chu kah chhuah a ni a. He boruak lawngah hian

Sergei Zalyotin-a leh Aleksander Kaleri-a an chuang a, a siam that ngai lai te han siam thain, thla hnih lai an han thang a. Russia pawhin han chei that leha hman chhunzawm zêl a duh viau laiin, a aia changkâng zawk International Space Station siam turin ram dangte nen tanho an lo tum tawh bawk si a, sum lamah harsatna a awm bawk nen Mir chawlhmun chu tihtâwpa, lâkthlak a titlu ta a. Ti chuan, kum 2011 March ni 21-ah lei a hêlna atanga lei tuamtu boruakah a tahtawla lâkthlak a lo ni ta a. Ti chuan, March ni 23-ah boruaka a kâng bâng chu South Pacific tuipuiah a tla ta a ni.

Mir chawlhmun hi thil zirna atân a tangkai mai bâkah International Space Station dinna atâna kawng sialna pawimawh tak a lo ni reng mai.

International Space Station

Kum 2011 December thlaa an zawh fel tak International Space Station hi khawvêl ram thenkhat tangrualin an siam a ni a. Lei chung km 370 atangin lei a hêl a. Thla lem pângngai ang thovin lei hêl mah se, mihringte vân sâng boruaka rei tak thil zira an awm theihna tura ruahman a nih avangin vân sâng chawlhmun (space station) tia vuah a ni.

He International Space Station dinna tura hmanrua hi kum 1988 November ni 20 khan vân sângah an han chho tan a; US Space Shuttle te, Russia boruak lawng Proton te leh Russia Soyuz rocket te hmanga dah chhoh a ni a. Russia sorkârin ama puala Mir 2 space station din



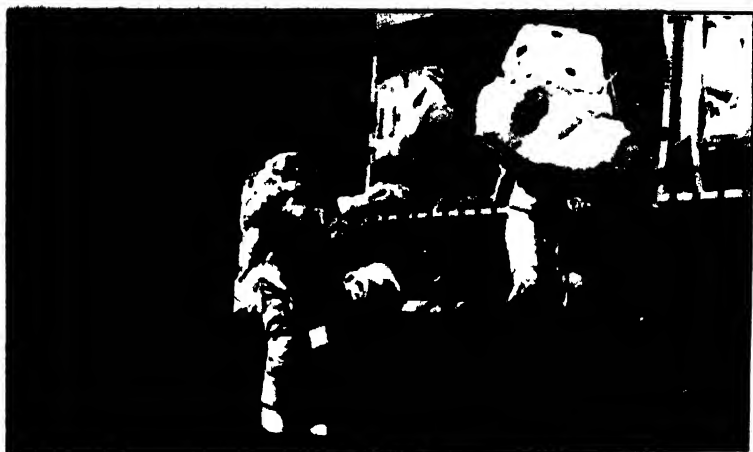
International Space Station

a tum mek te, America pawhin Freedom space station din a tum te leh European Space Agency-in Columbus a lo ruahman mekte chu inthuruala kaikawpin he International Space Station dinho turin hma an la ta thung a ni. Tichuan, he vân sâng chawlh hmun dinnaah hian ani pathum bâkah Japan Aerospace Exploration Agency leh Canadian Space Agency leh ram dang thenkhat an tel ve bawk a. A sênso hi tûn hma lama space station aiin a sâng lâwt lak a, US dollar tlûklehdingawn 150 man hu vêla chhût a ni.

He station din chung hi kum 13 lai a ni a, a sênso pawh a tamin Russia chawlhmun din Mir ai pawhin a lêt li laiin a lian a. A chung boruak pawh thlawhtheihna Boeing 747 chung ang vêlin an thunun a, hahtam takin a chungah rei tak thil zira awm theihna tur a ni. Tha hrui atân solar panel hmanga ni zung chakna a dawn chu a hmang ber a; a tirah kum 2016 thleng hman tura an ruahman chu kum 2020 emaw 2028 thleng pawh hman

theih a ni mai thei. Thenkhat chuan hetiang space station sēso tam lutuk din hi an hnial kalh ve bawk.

International Space Station hi vân sâng boruakin mihring leh thil nung dangtea nghawng a neih dân leh an hriselna a khawih dân zirna atâna tih a ni deuh ber a. A bîkin thla leh sikeisen chanchin zir tura kawng hrang hranga lo inbuatsaih lâwkna atâna tangkai tura beisei a ni.



Astronaut-te International Space Station-ah

Kum 2012 chhung khan boruak lawng Space X Dragon chu tum thum lai kah chhuah niin, International Space station-ah thawn chhoh a ni a. He space station hi a la tangkai dawn chauh a ni.

Expedition 36

International Space Station hi member ram hrang hrangten an tlawh deuh reng thin a, enchhinna hrang

hrangte an ti thin a ni. Expedition 36 hi May 13, 2013 aṭanga September 11, 2013 chhûng awh tûra tih a ni a. International Space Station-a mihring an thawnte hian thil chi hrang hrang an zir ang a, Space Station aṭanga chhuakin vân sâng boruakah an kal leh dâwn a ni. A thawh khatnaah Baikanur Cosmodrome, Kazakhstan aṭangin Soyuz TMA-08M hmangin March 28, 2013 khân mi pathum Pavel Vinogradov (Russia), Alexander Misurkin (Russia) leh Chris Cassidy (USA)-te an thawn chho phawt a, a hnu May 28, 2013-ah Soyuz TMA-09M hmangin Karen L. Nyberg (USA), Fyodor Yurchiklrin (Georgia) leh Luca Parmitano (Italy)-te an thawn ve leh a, an vaiin paruk an ni ta a. A thleng hmasa pathumte hi September 11, 2013-ah bawh leia lo kîr leh tûra tih an ni a, a hnunung pathum hi November 10 hmaa lo kîr leh tûr an ni thung.

Aw le, vân sânga hma lakna pawimawh tak takte hi chipchiar takin kan sawi seng lo va; amaherawhchu, keirin kan ngaihven vak loh lai hian kawng hrang hrangin khawvêl ram hrang hrangin vân sâng lamah hian tan an la reng tih erawh chu kan hriat a tha âwm e.



8

MIHRING DANG AN AWM VE EM?

Vân lam hun kan kai hnu leh tûn hma lam pawha mihring rilrua lian tak pakhat chu 'mihring dang an awm ve ang em' tih hi a ni a. Scientist-te chhût dânin he kan awmna thlasik kawngah ngawt pawh arsi tlûklehdingâwn za aia tam an awm a. Chung zînga tam tak chuan kan nî angin hêltu planets (exoplanets) an nei ve a. Chung arsi zîngah chuan kan nî ang tiat arsi tam tak an awm a, chung arsite chuan an planet zîng rau rauah pawh kan lei leh nî inhlat dân nena inang an neih ngei rin a ni bawk. Engkimah inang vek lo mah se nunna awm theihna tâwk tur chu a awm thei ngei ang. Scientist-te chuan chung lai hmunah chuan mihring dang an awm ringin, inbiakpawh dân kawng an dap chho ta zêl a.

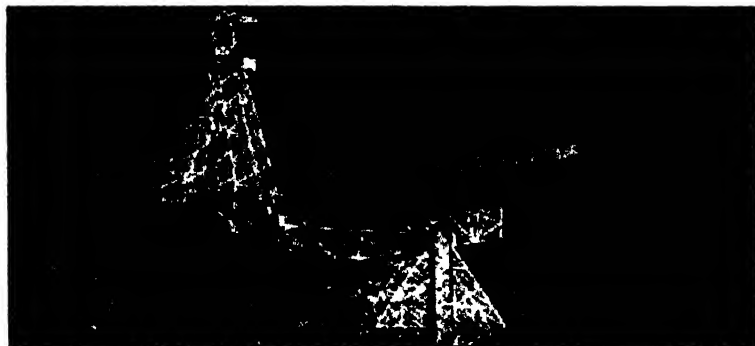
Planet-hote zînga kan thenawm hnai Mars-ah pawh mihring kan la inthawn thei lo chu a ni a; arsi dang awmna ram thlenga mihring han thawn phe chu kan la hlat hlein a lang. Lo zin thei ta pawh ni ila, mihring dam chhung hian a daih dawn lo. Kan nî tih lovah chuan Proxima Centauri khi arsi hnai ber a ni a, chu pawh chu lei aṭanga light year 4.25 vêla awm a ni a. Chuti ang khawpa hla an nih hlawm avang chuan mihring tân arsi dang awmna hmun han thlen chu a

khirh hle ang. Boruak lawng chak tak tân pawh hun rei fê thang a ngai dawn a ni.

Scientist thenkhat chuan he kan awmna Thlasik kawng huam chhungah pawh hian mi fing tak tak, hmun hrang hrangah awm teuhin, radio hmangin an inbepawh reng tawh a, engtikah emaw chuan an inpawhna chu zawm ve tura min sâwmna kan la hmuh ngêi an beisei tlat a ni. Keini aia finge an nih hlahuh phei chuan keinin kan zawng ang bawh hian min rawn zawng ve reng mai thei a; chumi kan lo man fuh hlahuh mai zawngin kan tân a awlsam phah hle dawn a ni. Ti chuan, hmun dang atanga an thu rawn thawn signal lo dawngsawng thei turin radio telescope an siam chhuak ta a ni.

Ozma Project

Kum 1960 khan West Virginia, USA-a National Radio Astronomy Observatory-ah Dr. Frank Drake-a chuan hmun dang atanga signal lo kal lo dawngsawng turin hma a la tan ta. Hemi project hmingah hian 'Ozma' vuah a ni a.



Radio telescope, West Virginia

Ti chuan, radio telescope feet 85 laia hlai chu kan nî ang tiat arsi pahnih Tau ceti leh Epsilon Eridâni lam a hawitîr ta vu mai a. Heng arsi pahnihte hi kan lei atanga light year 12 vêla hlaah an awm a ni a. Thla thum chhung zet chîk taka signal an lo ngaihthlâk hnuah pawh engmah dawnsawn an neih loh avangin an hna chu an titâwp ta rih a.

SETI Project

Project Ozma a lo tâwp hnu chuan Russia, America leh Canada ramte'n hma an la chho ta zêl a. Radio telescope tha zawk hmangin vân boruak zau taka mihring dangte thu thawn lo man ngei turin ngawrh takin an bei zui zêl a. Kum 1971 khan Russia ram Armenia hmunah hetiang lam hawia khawvêl pum huapa intawhkhâwmna ropui tak an nei ta nghe nghe. Heta tang hian lei piah lam mite zawna hna 'Search for Extraterrestrial Intelligence' (SETI) an tan ta tak tak a ni. A tîrah chuan an phur chho hle nain tumah beisei ang he hu chuan an hlawhtling ta lem lo va.

America chuan SETI project chhunzawm nân a hma aia nasain tan a la sauh sauh a. He universe zau taka khawii lai ber atang pawha signal lo kal rêng rêng lo dawngsawng thei turin radio telescope chuan beng a chhî reng a. A bîk takin kan lei atanga ri hnai deuh deuh zasarih lam atanga signal lo kal chu ngun lehzualin a lo ngaithla a. Signal eng pawh lo dawng zêlin khâwl thluak nei (computer) hmangin a lo thliar

hrang zêl a. Lei piah lam mite thu thawn a awm em, tih a lo chhui nghal zêl bawk.

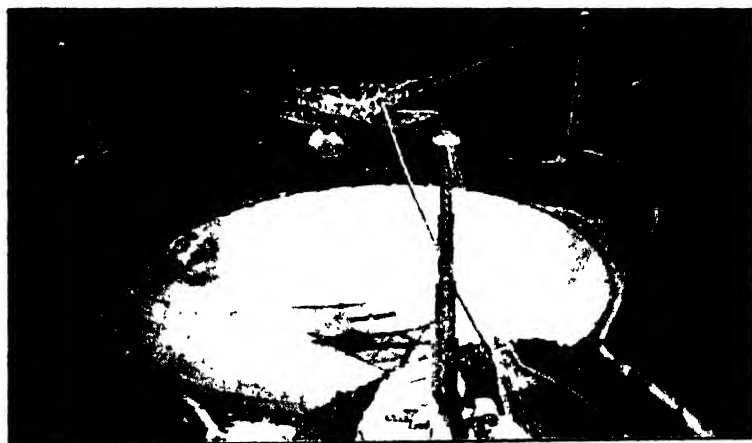
Kum 1985 atang khan France sorkâr pawhin America siam *super receiver* ang hi la chhâwngin radio telescope tha ber chi chu a siam tan ve a. Ti chuan, France sorkâr pawhin SETI project chu zawm vein dinhmun pawimawh tak a chang ve ta a ni. An radio telescope siam hi khawvêlah a lian ber dawttu niin SETI project atân phei chuan a tha ber chi a ni ang.

Japan scientist-te, Italy rama scientist-te leh khawvêl hmun hrang hranga scientist-te chuan he SETI project hi zawmin an radio telescope hmangin lei piah lam mite zawнна kawngah hma an la chho mek zêl a. Ti chuan, mihring dange thu thawn an hmu emaw hmu lo emaw lei mihringte hian kan hriat loh ram vân boruak zau tak, khawi lai hmun emawa awm vete khi biakpawh tumin leh taksa ngei pawha tlawh pawh tumin beipui kan thlâk tan dawn chauh a ang hle mai.

Radio Signal an thawn

An thu lo thawn hriatthlam tum râna beng kan lo chhit reng lai hian keini anga kan thu thawn lo ngaichânga theih tâwpa tan la an lo awm ve ngei ang le. Chuti a nih si chuan an signal lo dawnawng ngawt tum lovin, lei mite pawhin kan thawn ve a va ngai âwm ve . Keini'n an radio signal kan lo man fuh theih loh laiin anni zâwkin an lo man thiam zawk mai thei asin.

Kum 1974 khan Puerto Rico rama Arecibo hmuna radio telescope chu signal thawn nân an hmang ta. Hetih hun lai hian he radio telescope hi khawvêla lian ber a ni a; a hlai zâwng feet 1,000 a tling hial a ni. Kan thlasik kawng pêlin, lei atanga light year 100,000-a hlaah signal a thawn thleng thei hial a ni. Ti chuan, lei piah lam mite nena kan inbiakpawhna chu kan inhlatna ngawt chuan min dang ta lêm lo. Amaherawhchu, kan thu inthawn kan inhrethiam tawn ang em tih leh kan inman tawn thei ang em tih lam ngaihtuah a ngai leh ta.

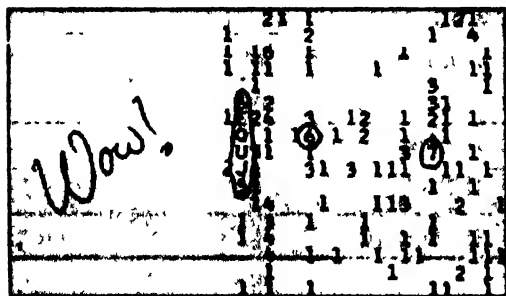


Radio telescope, Arecibo

Arecibo atanga signal thawn hi thawn chhinna ang lek a nih avangin minute thum chhung lekin an thawn a ni a. Mihring pian hmang lan dân leh lenzâwng te, taksa chhung insiamdân te leh kan awmna solar system chanchinte an thawn a ni a; lo hrethiam tak ang maw. An signal thawn hi arsi bâwr, arsi nuai khat lai awmna hmun,

a hming M 13 lamah a ni a. Signal thawm hi lo dawngsawngtu awmin, an dawn vêleh lo chhâng lêt vat pawh ni se, a hma berah kum AD 50,000 vêlah an chhânnain lei a lo thleng thei chauh ang.

Lei piah lam mite signal an dawng ?



Kum 1977 August ni 15 khan America vân lam chanchin zir mi Jerry R. Ehman, SETI project-a thawk mek chuan Ohio State University-a

an radio telescope lian takah chuan lei pian lam mite thu thawm (signal) ni âwm tak mai an khâwlah a hmu ta tlat mai a. He signal hi lehkhah chhu chhuakin "Wow!" tih anga lehlin a ni a. Signal hi second 72 chhung emaw lek an dawng a. Ngun taka an zir hnuah he signal hi lei piah lam mite rawn thawm ngei a nih an ring hle a; mahse signal dawn leh tuma khâwl changkâng tak tak hmanga beng an chhit hle pawhin a reh leh ta vang vang bawk si. Engpawh ni se, he signal hi lei piah lam mite thu thawm ni ngeia ngaih an dawn awm chhun a la ni âwm e.

UFO

Khawvêl sorkâr lianten radio telescope-te hmanga lei piah lam mite thawm riva ngaichânga an beng an chhit

reng lai leh boruak lawng te, lei piah lam mite lo hmuh atân a thawm mêk lain, thenkhat chuan chuti ang mai mai tia hun leh sum khawhral a tul tawh lohzia leh lei piah lam miten minrawn tlawh reng tawh zawk a ni tih thu ha hîpin an sawi thung. Lei piah lam mite chuanna boruak lawng, thleng thlâwk thei hmu inti tam tak an awm tawh a; thenkhat phei chuan a mi chuange lama an hmuh thu an sawi bawk. Hetiang thleng thlâwk thei



Cape town, South Africa-a UFO

(flying saucer) hi Chiang taka fiah a la nih loh avangin a hmingah pawh 'Unidentified Flying Object,' a lam tawiin UFO tih a ni a. Mizo tawng chuan 'thil thlâwk, a nihna tak hriat chian loh' tihna a ni thei ang. A hmutu tam takin an sawi dânin chaw ei thleng bial khaikhup ang deuh tak a ni ber. Chi dang deuh hmute pawh an awm bawk. Tûn hma lama UFO chanchin tlêm i han chhui ila.

Kum 1978 khan Australia rama Melbourne khaw bulah thil mak tak mai a lo thleng a. Thlawhtheihna

khalhtu Frederick Valentich-a chuan thlawhtheihna a khalh mēk laiin thil eng emaw a lam hawia lo thlāwk a hmu ta tlat mai! A hmuh vēleh chuan chu thil thleng chu lei lamah a hrilh vat a. "Ka chungah a ding reng mai! Thlawhtheihna a ni si lo. Eng emaw ni" A sawi zawh hmawin a thu thawn chu a tâwp ta mai si a. Lei lama lo dawngsawngtute tân pawh a ngaihna hriat thiam a har hle. A thlawhtheihna hi Tasmania tuipuah a tla niin an ring nain, ngun taka an zawn hnuah pawh hnuhma engmah an hmu lo.

He thil thleng mak tak avang hian Melbourne khuaa Television thla latute chuan Wellington leh Christ Church inkār thlawhna kawng chu a thla an la ta ngāh a. TV thlalāk chu ngun taka an chhui hnuah thil eng emaw mak tak an hmu ta tlat mai! He thlalāk hi Dr. Bruce Maccabee-a, America lawng sipai pāwla mi chuan ngun takin a zir ta a. Thil mak danglam tak, a chānga ~~eng nēp deuh~~, a chānga ~~eng em em mai~~ niin a chhui chhuak a. A ~~chhūt dân~~ chuan a ~~eng tih~~ chhuah chak zāwng chu watt 100,000 a ni a, a len zāwng chu a laiah hawhtlangin feet 60 leh feet 100 inkār bāwr vēl niin a hre bawk. A thlawh chak zāwng pawh darkār khatah mel 3000 laia chakin a chhūt bawk.

Scientist-te leh thil chhūt mi tam tak chuan hetiang UFO kan tihho hi eng dang ni lovin, galaxy dang atanga keini lei mihringte min rawn tlawh tura boruak lawng lo kal ni ngeiah an ngai. Hetiang ngaih dāna hmahruaitu lār tak chu Switzerland mi Erich Von Däniken-a a ni. Kum 1968-a a lehkhaw chhuah 'Pathian sakawrtawhlailīr'-ah

chuan hmasânga thil mak tak tak an lo siam pyramid angte kha planet dang aṅga lo kal, mi fing tak takte puihna leh remhriatnaa din niin a ngaih dân a ziaik.

America President Eisenhower-a hun lai daih tawh aṅg khan mi thenkhat chuan UFO-a chuang mihring ang deuh, ke pasarih nei, kawr lang tlang thei ha an hmuh thu an sawi a; thenkhatin ke pathum neite pawh hmuin an insawi bawk. Thenkhat phei chuan, hetiang mi mak tak tak pathum hi America sorkâr chuan a man tawh a, tûnah hian an chhuah theih loh nân tân inah khungin ngun takin an vêng reng nghe nghe, tiin thu thang mak pui pui a awm a.

Hetieng thawm riva mak pui pui leh beng verh tak tak a lo awm chhoh tak zêl avang hian America thlawhna sipai pâwl chuan ngun zawka chhui turin rawtna an siam ta a. A chhuitu atân mi pali ruat an ni a. An hotupa ber chu Ohio state University-a vân lam chanchin hre mi Dr. J. Aullen Hynek-a a ni. Kum sawmhni h chhung zet mai UFO chanchin chhuiin an buai ta char char a. Dr. Hynek-a hi a hnuah phei chuan Smithsonian Astro-physical Observatory-ah Associate Director niin Astronomy Department-ah Chairman a ni ta nghe nghe.

A tîrah chuan Dr. Hynek-a hian UFO hi a awm tak tak a ring lo hle nain an chhût ngun telh telh hnuah a rilru pawh a dang chho ta zêl a. Ti chuan, nasa taka a beihna avangin Illinions-a Evanston hmunah UFO zirna hmunpui a ding ta a. Amah ngei chu Director a ni ta nghal

bawk. Ama duh dân ang ngeiin UFO chanchin chu ngawrh lehzualin an zir chhurzawm ta zêl a ni.

Dr. Hynek-a hian UFO an hmuh dân hi chi thumah a then a. A chi khatna chu râl ațanga hmuh, hnuhma awm lêm lo a ni a. Kum 1966, April ni 17 khan Ohio-a mi pakhat Dale Spour-a chu a thiante nen kawng sira car ruak lo ding reng en chlang tura an va hnaih laiin an piah lawk ațang chuan thil eng emaw hi chak tak maiin a lo thlâwk chhuak ta thut mai a. Chu thil mak tak mai chu hriat tumin police-ten en an umzui ta a. Mêl sawmsarih zet an chhui pawhin engmah hmuh tur a awm ta chuang lo va.

Kum 1965-a America boruak lawng Gemini V-a chuang pahni Mc Divit-a leh Edward White-a te pawh khan vân sâng a thlawh laiin UFO ni awm tak, êng êm êm maiin an hnung lam ațangin a rawn ûm niin an hmu a. Hetiang deuh bawk hi America boruak lawng bawk Apollo 12-a chuangte khan thla lam pana an zin kawngah an hmuh thu an sawi.

Kum 1971 pawh khan Sri Lanka-ah thil mak tak a thleng a. Thingpui huan neitupa Abelrickram-a chu a thiante nen zanah huana an lên laiin thil bial lian tak an lam rawn pan an hmu a. Chu thil mak tak mai chu a êng êm êm a; an bul boruakah chuan a ding ta vû mai a, rei lote hnuah chuan a thlâwk bo leh ta a. He thil mak tak mai hi anmahni bâkah an bul vêla mite pawhin an lo hmu ye a ni ti a hnuah an hria.

UFO hmuh dân chi huihna chu hnuhma a neihna a ni a. Kum 1970 khan Ethiopia rama Saladare hmunah thil

mak tak a lo thleng a. Thil mûm sen lian pui mai hian helai hmun hi a rawn hrût thuak a. A ri lah chu thlawhtheihna thlâwk ri ang mai a ni a. In eng emaw zât a tihchhiat bâkah lungremte pawh a tichim a; thing thenkhat phei chu a tlu kar hial a. He thil mak tak pawh hi UFO ni ngeiin an ring tlat a ni.

Kum 1971, November ni 2 khan America-a Delphis khuaah tleirawl pakhat chuan motor ri ang maia thil ri a hria a. A han en nâk chuan a piah lawkah chuan thil bial lian pui mai hi boruakah, lei chung lawkah hian a lo ding vû mai a. Chu thil mak tak mai chu a êng telh telh a, a thlâwk bo leh ta a. A hnua an han en chuan chu thil mak tak awmna zâwn lei chu feet 9 laia zau hi a lo khuar a, a bial kulh mai bawk a. Chumi bial chhunga hnim chu a ro vek bawk a.

UFO hmuh dân chi thumna chu a dang hle. Hetah hi chuan UFO chauh ni lovin a chhunga chuangte pawh an hmu thin. An pianzia pawh chi hrang hrang a ni a.



A tlângpuiin mihring ang deuh niin an sawi thin. Thenkhat phei chuan UFO-a chuangten an hruai bo thu an sawi hial mai! Kum 1979, November ni 9 khan Scotland rama ngaw pakhatah Bob-Jaylor-a chuan UFO-a chuang mi pahnih a hmu a. An pianphung a mak kher mai; tawlailir ke bial, bân nei ang niin a sawi.

Kum 1979 khan Italy rama police pakhat pawh cycle-a a chuan laiin UFO-a chuangten an man niin a insawi a. UFO-a chuang a hmuhte chu sâng pui pui, mit kil thum nei niin a sawi tlat thung.

Kum 1978 khan French sorkâr pawhin UFO hmutute thil hmuh chhui turin committee a din a. He committee-ah hian member pali an awm a; pakhat phei chu rilru lam thiam mi (Psychologist) a ni nghe nghe a. UFO hmutu nia insawite chu ngun taka zâwt chiangin an thil hmuh dân chu an chhui a. Hetia an chhui hnuah hian, UFO hmutute hian thil eng emaw, hriat thiam harsa tak zawngh hmuh an nei a ni tiin ngaih dân an nei.

UFO hi khawvêl hmuh tinah an hmu tawh emaw tih mawh a ni. Khawvêl ram 135 chuang atangin UFO an hmuh theihte dawh nia. Amaherawhchu, chhûttu tam theihte an repeat zing sarh zet zinga zaa sawmkua leh panga theihte hmuh sual niah an ngai. Hetiang thil hmuh sual theihte zinga a lâi deuh deuhthe chu - Chawngmawii (Venus) te, arsi thenkhat te, thlawhtheihna te, thla lem (satellite) te, arsi tla te, chhumte leh khaw awm dân zir nia an hman hampuar (balloon) te an ni.

UFO thenkhat chu mi tam takin a rualin an hmu thin a. A hnuah an chhui leh, hetiang chi hi chu kan sawi takte hmuh sual a ni tlângpui thin. Heng bâkah hian a mala hmu emaw mi tlêmtêin an hmuh tum tam tak a awm bawk. Kan sawi tawh angin, thenkhat pheichuan UFO-a chuangte an hmuh mai bâkah a mi chuangten an rukbo thute pawh an sawi bawk. Heti anga a bîk deuhva hmu intite thil hmuh hi chu finfiah a har ang reng hle. A sawitute sawi dânah emaw an rinawm leh rinawm lovah kan innghat a ni deuh mai.

America-a Dr. Edward U. Condon-a pheichuan UFO tia kan sawi vung êm êm hi engmah a ni lo ve. Chu vangin UFO chanchin ziahna rêng rêng hi tiral vek ila, a chanchin ziah rêng rêng pawh khap tlat ila a tha ang, tiin rawtna a siam tlat thung. UFO ka hmu intite phehi hi chu khawtlângin ensan tur a ni ti hialin rawtna a siam a. Nimahsela, chuti ang ngaih dân a lo awm hnuah leh scientist tam tak pawhin UFO hi engamaha an ngaih loh hnuah pawh hmutu an la awm zêl si! A bîk takin ram changkângah an inlâr nasa emaw tih mai tur a ni. Scientist thenkhat chuan UFO-a chuangte hian khawvêl boruak, sik leh sa kalphungte pawh hi an control thei niin an ngai hial. Thenkhat pheichuan kan lei khawilaiah emaw hian awmhmun an khuar reng tawh niin an ring.

Kan sawi tak bâkah khan UFO hmuh dân chanchin leh UFO chungchâng ziah tur tam tak a awm a; tân tumah chuan kan ziake sêng lo va, tân hma lama mi tlêm ka han

tarlång mai a ni e. Kum 2012 leh 2013 thleng pawhin hmun hrang hrang atangin report an la dawng zêl a. April 14, 2013 khân Brazil rama Senhor Do Bonfim hmunah thîrsakawra chuangin chhûn laiah UFO a hmu a, a thla pawh a la nghe nghe a, July 15, 2013 pawh khân La Prairie Quiebez, Canada-ah chhûngkuain zânah UFO an hmu bawh. Hetiang UFO hmuh report leh thlalâkte hi hmun hrang hrang atanga dawn a ni a, Internet-ahte pawh hmuh tûr a awm reng mai.

Aw le, UFO hi lei piah lam mite boruak lawng nia ngaiin, lei piah lam mite hi he kan galaxy-a khawii lai ber atangin emaw galaxy dang atangin emaw, he lei mihringte kan tura hlate khua atanga lo kal angah han pawm dawn pawh ni ta ila, kawng lehlamah chuan tân thleng maia chiang taka finfiah theih a la ni lo tlat mai hi thil mak tak zawng a tling ve rêng rêng mai. Chu vangin, lei piah lam miten min rawn tlawh tawh ngei nia ringte tân leh la ring lo tân pawh inhrîal theih tak chu a la ni.



9

VÂN SÂNGA INDIA HMASÂWN DÂN



Vikram A Sarabhai

Kum 1920 bâwr vêl khan S.K Mitra chuan Calcutta(Kolkata)-ah lei atangin lei tuamtu boruak chuan chung lam ionosphere chu a lo zir tan tawh a. Hemi hnu chuan C.V.Raman leh Meghna Saha te pawhin tlêm tlêm chuan vân lam chanchin zirna lamah hma an lo la tan bawk.

Amaherawhchu, India scientist-te zinga mûmal taka vân lam chanchin zir intanna chu kum 1945 hnuah a ni a. He mi chungchânga hma hrulaitute chu Ahmedabad-a Physical Research Laboratory dintu Vikram A Sarabhai leh Tata Institute of Fundamental Research dintu Homi Jahangir Bhabha te an ni. Vikram Sarabhai pheh chu hma lam thlîr thiam tak a ni a, India Space Programme hmasâwnnaa sul sutu a nih avangin 'Father of Indian Space Programme' ti hiala koh a ni ta a ni.

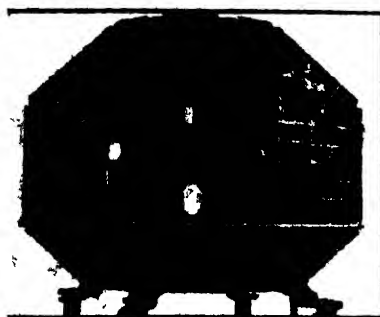
Kum 1950-ah Department of Atomic Energy din a lo ni a, Secretary atân Dr Homi Bhabha ruat a ni a. He department hian vân lam boruak chanchin zirna lama

pawh sum leh pai sêngin leh zirna hmun observatory-te a din a. Hetih laia Prime Minister Jawaharlal Nehru pawhin a tuipui êm êm a. Tichuan kum 1962-ah Indian National Committee for Space Research (INCOSPAR) chu din a lo ni ta a, Chairman atân Vikram Sarabhai ruat a ni ta nghe nghe a.

Kum 1963-a Trivandrum khaw bul lawka sângha mantute khaw tê tak tê Thumba hmun 'Thumba Equatorial Rocket Launching Station' din a lo ni ta a. Kum 1969-ah Indian Space Research Organisation (ISRO) din a lo ni a, Indian National Committee for Space Research chu tihtawp a ni ta thung a. Kum 1972 atângin Space Commission leh Department of Space (DOS) din a lo nih hnu phei kha chuan vân sâng lama hmasâwnna a lo chak ta hle. Tichuan, ISRO chu Department of Space hnuaiâh hian hmasâwnna kawnga kutke tak tak niin, kawng hrang hrangin hma a la ta a ni. ISRO leh Department of Space hmunpui ber chu Bangalore a ni a; he Department hnuaiâh hian hmun hrang hrangah 'research' tihna hmunpui te, thla lem leh rocket siamna hmun te, thla lem enkawlina hmun leh thla lem thlalâk lo dawnawna hmun te, thla lem thlalâk hmanga ram hausakna chhuina leh enkawlina hmunte hun hrang hrangah a awm bawk.

Thla lem hmasa leh thla lem phurtute

India hian hma a sâwn chak hle mai. Kum 1975, April ni 19 a lo ni a, ama siam ngei thla lem 'Aryabhata' kg. 360-a rit chu Russia ram atângin Russia thla lem



Aryabhata

phurtu rocket hmangin a kâp chhuak ve thei ta der mai. India-in hetiang thla lem a siam ve thei ta mai chu mi tam takin mak an ti a; amaherawhchu, hmân lai aţang tawha India mite, science, technology leh mathematics lama an lo sân

thin tawhzia hre tân chuan thil mak vak a ni âwm lo ve. Aryabhata an kah chhuah hnu hian TV thlâlakna keŋg thla lem pahnih Bhaskara-1 leh Bhaskara-2 chu Russia ram aţang bawkin kum 1979 June thla leh kum 1981 November thla khan kah chhuah an lo ni leh a. Heng thla lemte hian ram thlâte lain leiah an rawn thawn a; India Scientist-te a tiphûr hle.

Kum 1977 leh 1979 chhung khan inbiak pawhna lam atâna enchhinna angin America thla lem ATS-6 chu ISRO chuan a hmang a. He thla lem hmang hian thingtlâng khaw 2400-ah TV Programme a thawn a. France leh German puihnain hetiang chi bawk thla lem 'Symphonie' chu inpawhna lama enchhin nân a hmang bawk.

Hmasáwnna a kal zêl a, India chuan thla lem phurtu 'Satellite Launch Vehicle' a siam ve ta a. He thla lem phurtu hmasa ber SLV-3 hi chhâwng li a ni a, km 500 vêla sângah thla lem kg 40-a rit dah thei tura siam a ni a. He rocket hmang hian India siam Rohini thla lemte chu kum 1980, 1981 leh 1983-ahte lei hêl turin vân sângah kah chhuah a lo ni ta.

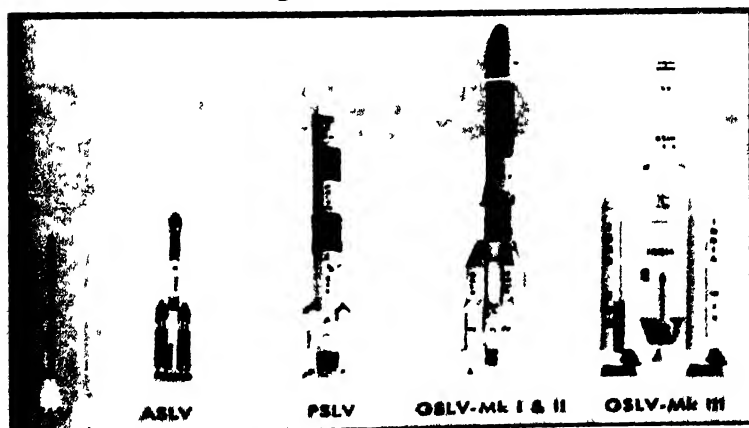
Kum 1981, June thla khan India chuan a inbiak pawhna thla lem enchhinna atân ama siam APPLE (Ariane Passenger Payload Experiment) chu European Space Agency thla lem phurtu 'Ariane launch vehicle' hmangin a kâp chhuak leh a. He thla lem hi 'geostationary satellite' kan tih ang chi kha a ni a; lei vir ruala kal ve zêlin India ram chung zâwnah a awm reng a, kum hnih leh thla thum chhung zet tluang taka hna a thawh chhungin India ram hmun thenkhatah inbiakpawh nân leh TV programme thawn nân te an hmang a.

Thla lem phurtu SLV-3 hnuah khan a aia lian leh changkâng zawk ASLV (Augmented Satellite Launch Vehicle), chhâwngha, thla lem kg 150-a rit phur thei tur chu India chuan a siam leh a; amaherawhchu, tum hnih zet chu an hlawhchham tlat mai. Kum 1987 March ni 24-a ASLV hmanga SROSS-1 thla lem kah chhuah an tum chu a hlawhchham hlauh mai a, kum 1988 July ni 13-a ASLV hmang bawka thla lem SROSS-2 an kah chhuah pawh an hlawhchham leh bawk. Hemi tum hian thla lem phurtu rocket chuan second 150-ah km 25-a sâng a thlen chhoh hnuin Bay of Bengal-ah a tla ta a; a hrilhhaithlâk hle. He rocket hmanga an thlalem kah chhuah chu vawi hnih chiaa a an hlawhtling thei nain, hmasâwnna pawimawh tak a ni tho mai.

ISRO chuan ram thla latu thla lem 'Remote Sensing Satellite' kah chhuah nâra hman tur Polar Satellite Launch Vehicle (PSLV) chu a siam leh ta a. He rocket hi chu a rintlâk ta hle. He PSLV hmang hian India thla lem 26 leh

ram dang thla lem 29 hlawhtling taka kah chhuah tawh a ni a; kum 2008, April thla pheih kha chuan tum khata thla lem 10 lai kâp chhuakin, Russia khûmin, tum khata rocket kah chhuah tam ber a lo ni ta hial a. Tum 22 kah chhuah a ni a, chutah chuan kum 1993 September thlaa an kah chhuah hmasak ber tum tih loh chu a hlawhtling veka, India ram pawhin a chhuang hle.

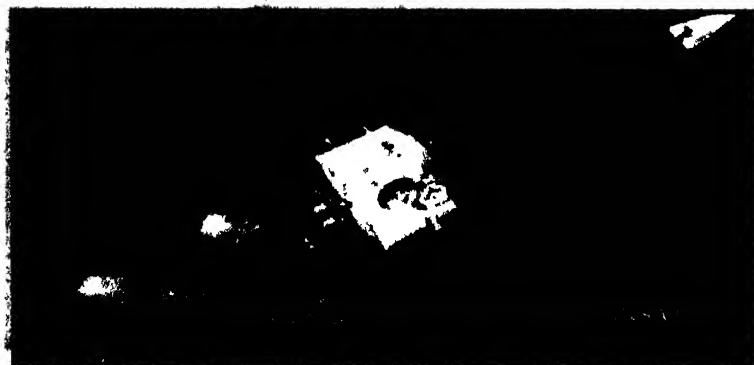
Thla lem rit chi kah chuahna tura siam Geosynchronous Satellite Launch Vehicle (GSLV) hi Indian thla lem phurtu siamah chuan a lian ber a, thla lem ton 5 laia rit kâp chhuak thei tura ruahman a ni a. Amaherawh chu duh angun a la hlawhtling lo va, kum 2010 December ni 25-a an kahchhuah tum hnuhnung ber pawh a hlawhchham tlat mai. Nimahsela, ISRO chuan tan la zêlin Geosynchronous Satellite Launch Vehicle Mark-III (GSLV-III) chu a ruahman chho leh ta a. A hlawhtlin theih chuan thla lem rit chi kah chhuahah pawh a intodelh hle tawh ang.



India hian khaw awmdân leh lei tuamtu boruak zir nân rocket eng emaw zât siamin Thumba-ah te, Shriharikota-ah te leh Balasore-ah te enchhirina a nei deuh reng thin. Hetiang rocket zînga lian ber chu RH-560 a ni a; thil kg. 100 phurin km. 350 laia sâng vân lamah a chhoh pui thei a ni.

INSAT

India chuan khaw awmdân hriatna leh inbiak pawhna atâna hman kawp theih Indian National Satellite (INSAT) kah chhuah tumîn tan a la chho a. INSAT hmasa ber INSAT-1A chu kum 1982 April ni 10 khan America atângin kah chhuah a lo ni ta a; amaherawhchu, a thawh tur ang thawk thei lovin, an kah chhuah atanga ni 147 lekah a khâwl a thi ta hlauh mai a. Ti chuan, a thlâk turin INSAT-1B chu kum 1983, August thla khan Kennedy Space Centre, America atângin space shuttle hmangin an kâp chhuak leh a; hei hi chu a hlawhtling hle. TV programme thawn chhawn nân te, inbiakpawh nân te, khaw awmdân tur hriat lawk nân te a tangkai hle.



INSAT-1B thlak tur hian India chuan INSAT-1C kah chhuah leh a tum a. Amaherawhchu, kum 1986, January thlaa space shuttle Challenger vânduaina avanga mi pasarih zet an thih avang khan India chuan a thla lem, America space shuttle hmanga kah chhuah a tum pawh chu a thulh leh ta rih a; kum 1988, July ni 22 khan European Space Agency kahchhuahna hmangin INSAT-1C chu a kâp chhuak ta zawk a. Nimahsela, a khâwlah that lohna a awm ta tlat mai a, a hnathawh tur ang zâtve chauh a thawk thei ta a. Kum 1989-ah pheih chuan hman tlâk a ni ta lo va.

Kum 1989 June ni 20 khan INSAT-1D chu kah chhuah tuma Delta rocket nena an zawm laiin, a khâwl thenkhat a chhe hlauh mai a; a kah chhuah hun pawh an sawn hla leh ta a. Ti chuan, an siam that hnuin kum 1990, June ni 12 khan Cape Canaveral atangin Delta rocket hmang vêk chuan hlawhtling taka kah chhuah a ni ta a.

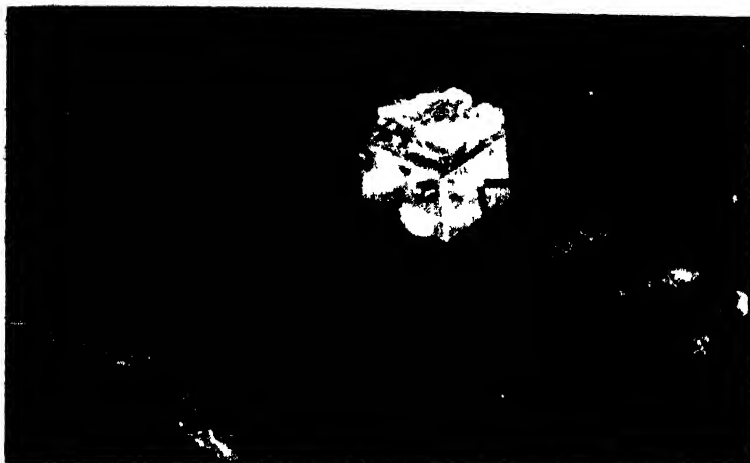
INSAT-1 thla lemte bâkah hian TV programme thawn chhawanna leh inbiak pawhna leh khaw awm dân thlalâkna hmanraw tha zawk nena thuam eng emaw zât kah chhuah a ni tawh a. Chung zingah chuan INSAT-2E, INSAT-3A, INSAT-3C, INSAT-3E, INSAT-4A, INSAT-4B, INSAT-4CR, INSAT-4G te hi a lar zual an ni a, an chanchin erawh kan sawi sêng lo vang. Tichuan, INSAT programme bikah thla lem 21 kah chhuah tawh zingah kum 2013 kum tîr thlengin thla lem 11 lai hman theihin vân sângah an awm mek a. Heng thla lem kan sawi takte hi India rama Tele Communication Department te, Indian Meteorological

Department te, All India Radio leh Doordarshan-te tân an hluin an tangkai êm êm a ni.

Remote Sensing Satellite

India chuan ram leilung zirna tur atâna thlalâkna keng tel thlalem Bhaskara-1 leh Bhaskara-2 chu enchhinna ang deuhvin kum 1979 leh kum 1981 khan a kâp chhuak a. Kum 1988, March ni 17 khan heng aia changkâng leh tha, Indian Remote Sensing Satellite (IRS-1A) chu Russia ram atangin hlawhtling taka kah chhuah a lo ni ta a; India ram tân chuan a lawmawm tak zet a ni. Hetiang ram leilung hausakna (natural resources) chhuina tur bîk thla lem hi ram hrang pali : America, Russia, France leh Japan-ten anmahni pualin an nei tawh a; India chu a pangana a lo ni ve ta reng mai. He thla lem hi kg. 960 zeta rit a ni a. Km. 904 a sângah hmar lam atanga thlâwkin chhim leh hmar dungzui zâwngin lei a hêl a. Ni khat chhungin India ram zawnah vawi sarih emaw vawi riat emaw a thlâwk tlang a. Hetia a thlawh chhung hian a thlalâkna ken chuan ram thlâ a la zêl a, Hyderabad bul lawk Shahnagar-ah a thawn a, chu lo dawngin, kan düh lai ram chanchin kha a zir theih ta a ni. Thla lem thlalâk hmang hian ram ngaw, lei pawnsang leh chhungril lamte pawh a zir theih vek a, a tangkai hle.

Tichuan, IRS thla lem dang pawh an kah chhuah belk zêl a, hmingah pawh IRS-B, IRS-P1, IRS-P2, IRS-1D, IRS-P3, IRS-1D, etc. tîm an yuah a, thlalâkna tha zawk leh changkâng zawk an kentir zêl bawk a, a hnu lamah



IRS-P3

chuan a hmana tur bîk azirin OceanSat-1, OceanSat-2, CartoSat-1, Cartosat-2, ResourceSat-1, ResourSat-2, RISAT-1, etc. tiin a hming an phuah ta thung a. Tûnah hian India chuan vân sâng boruakah remote sensing thla lem 12 vêl neiin, khawvêlah mipui vântlang tâna hman tur thla lem nei tam ber a lo ni ta hial a ni. Kum 2013, March ni 17 kha IRS thla lem hmasa ber kah chhuah atanga a kum 25-na champhaphâk a ni a, a lawmna hun pawh Bangalore-a ISRO headquarters-ah neih a ni a. Kei pawh min sâwm ve naiin, ka kal hman ta lo va

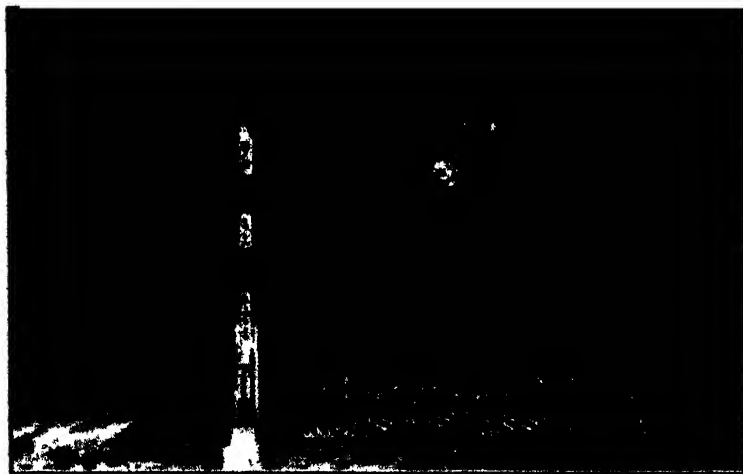
Thla lem dang

Kan sawi tak bâkah hian India chuan hmanna tur bîk neiin thla lem dang pawh a kâp chhuak nual a, chung zingah chuan RISAT, KALPANA-1, GSAT-2, Edusat, GSAT-12, GSAT-10 leh SARAL te hi a lâz zualte an ni a.

GSAT-10 hi kum 2012-a kah chhuah a ni a, a hnuhnung ber SARAL hi India leh France intawm a ni a, February ni 25, 2013-ah kah chhuah a ni a. Kum 2013 July ni 2 khan ISRO chuan Sriharikota-a Satish Dhawan Space Centre atangin Indian Regional Navigation Satellite System (IRNSS) chu PLSV-C22 hmangin hlawhtling takin a kap chhuak ta bawk.

Chandrayaan boruak lawng

India hlan hma a sawn chak hle mai! Lei lam chanchin zir mai duh tawk lovin hma a la zel a. Kum 2008 October ni 22-ah Satish Dhawan Space Centre, Sriharikota atangin thla chanchin zir turin boruak lawng Chandrayaan chu hlawhtling takin a kap chhuak ta a; India ram tan van lam chanchin zirnaah rahbi pawimawh tak a lo ni ta a ni.



Chandrayaan Mission

He boruak lawng hian November ni 8, 2008-ah thla a hêlna tur hmun a han thleng a, thlalâkna tha tak a keng a, kum hnih chungin thla leilung thla lain, a bîkin thla chhim tâwp leh hmar tâwp lamte hi vûr a awm rin a nih avangin zir ngun bîk tura tih a ni a. Tichuan, beisei ang ngeiin Chandrayaan-1 hian thlaah tui a awm a ni tih a han chian ta tlat mai! Tui hmuh chhuah hi hun lo la kal tur atân a pawimawhin, India scientist-te mai ni lovin thla lama hma lak leh tum khawvêl ram dangte pawh a tiphûr hle.

ISRO chuan Chandrayaan-2 boruak lawng chu thla lamah tih a tum leh a; tûn tumah hi chuan he boruak lawng hian thla hêl mai bâkah thlaa tum tur (lander) a keng tel anga, chu chuan thla leilung zira vak kual tur (rover) a phur tel bawk dawn a ni. Chandrayaan-2 atang hian thla leilung chanchin leh a lo insiam dân chanchin kimchâng zawk hriat theih beisei a ni.

Nakin lawkah chuan ISRO hian Mars (Sikeisen), Venus (Chawngmawii) leh planet dangte zir turin boruak lawng a la thawn ve ngei dawn e.

Ram dang nena inkûngkaih dân

India hian vân sâng lama hma a sâwnna kawngah hian ram dangte nen inkûngkaihna a nei tha hle. Chung zînga lâr zual deuh deuhthe chu : Russia, America, Germany (FRG), France, European Space Agency (ESA) leh United Kingdom-te an ni a; a bîk takin Russia nena an inkûngkaihna hi a thûk niin a lang. Thumba-a rocket

kah chhuahna din tum pawh khan Russia hian a pui a; a khat tawkin Thumba-ah hian inthurualin khaw awmdan zirna turin rocket an kap chhuak reng bawk. India thla lem hmasa Aryabhata te, Bhaskara-1 leh Bhaskara-2 te kha a thlawh liau liaua Russia-in a kah chhuahsak a ni a; chu bakah Russia hian Luna-24 hmanga thla leilung a han lak kha India Scientist-te zir atan eng emaw zat a sem ve bawk, Kum 1984 April ni 3 khan India mi Sqn. Ldr. Rakesh Sharma-a pawh Russia mi pahnih nen boruak lawng Soyuz T-11 hmangin Russia van sang chawlhmun Salyut 7-ah a han zin ve a, India mi van sang zin hmasa ber a lo ni ve ta.

Indian chuan United Nation puihnain Centre for Space Science and Technology Educatin in Asia and Pacific a din a, khawvel huan committee hrang hrang - Corpos-Sarsat, Astronautical Federation, Committee on Space Research, Inter-Agency Space Debris Co-ordination Committee, International Space University leh Committee on Earth Observation Satellite-ah te member pawimawh tak a ni a.

Thlaa hel tura boruak lawng a thawn Chandrayaan-1 khan ram dang NASA, ESA leh Bulgarian Space Agency khawh te phurin, ram dang tan pawh malsawmna a ni chho ta zel mai. Chutih lain mihring chuanna boruak lawng Chandrayaan-2 buatsah mekah Russia chuan thla leilunga yak kual tur (rover) siamah a tha a thawh ve dawn bawk.

Văn sâng thiamna hi a va tangkai êm!

Department of Space leh ISRO hmalákna hi department malah a tâwp mai lo va, Central Department leh Organisation hrang hrangte hian an hmang mək a, India rama department tin deuhthaw hian an hmang tangkai tawh a ni. Telephone hmanga inbiakpawhna leh TV programme thawn chhawn nân te, computer hmanga inzawm nân te, leilung hausakna chhui chhuah nân te, ram hmasâwna tur ruahmanna siam nân te, khaw awm dân hriatna leh puan lâwk nân te a pawimawhin, văn sâng lam thiamna tel lo chuan kan che thei ta meuh lo a ni. Lei tuamtu boruak chanchin kan hriat belh bâkah vân lam chanchin pawh kan hriat belh zêl.

ISRO hian India ram hmun hrang hrangah Centre a din a, state tinah ISRO hriatpuiin Remote Sensing Centre / Space Application Centre din a ni tawh bawk. Mizoramah pawh Directorate of Science & Technology, Planning Department hnuaiah Mizoram Remote Sensing Application Centre (MIRSAC) chu din a ni a. He centre hian India rama ISRO hnuaia centre hrang hrangte nen satellite thlalák hmanga thil zir hna an thawk reng thin. Chu bâkah Mizoram chhunga Department hrang hrangte mamawhte thawhsakin, Mizoram tâna tangkai tur project siamin, an thawk bawk thin. Tûnah hian sorkâr Department zawng zawng tih theih deuh thawin eng emaw kawng talin space technology hi an chhawr tawh a ni.

Vân sângah mihring thawn ye tum a ni

ISRO chuan vân sâng boruaka mihring thawn ve thei ngei turin ruahmanna a siam tawh a, sum tam tak sên a ngai dawn a ni. He ruahmanna hi pawm a nih chuan tân aţanga kum 7 vêl hnuah chuan vân sâng boruakah mihring a thawn ve theih beisei a ni. Tûnah hian inbuatsaihna a kal chho mêk a; Bangalore-ah vân sâng zin mite inzirna hmun (Astronaut Training Centre) din tura hma lâk a ni a, mihring chuanna boruak lawng kah chhuahna tur bik pawh Satish Dhawan Space Centre, Sriharikota-ah bun a ni ang. Mi pathum chuan theihna boruak lawng, vân sânga ni sarih vêl thang theihna tur pawh ruahman chhoh mêk a ni. India hmasâwn chak dân han ngaihtuah hian, he thil ruahman pawh hi a hlawhtlin ngei a rinawm. Tihhlawhtlin a nih ngat chuan, India chu vân sâng lamah a chungnung pâwl tak a ni thei dawn a ni.



- Ván lam hun lo inñan dân
- Ván sânga inelna
- Thla lama inelna
- Mihring dang an awm ve em?
- Hmasâwnna thar
- Ván sânga India hmasâwn dân, etc.

He lehkhahuah hian mihringin ván lam chanchin hriatna kawnga hma a sâwn dân te, ván sânga zin chungchange suangtuahna an neih tih atanga a taka a hlen chhuah dân leh tuna ván sang lama khawvêl dinhmun tlangpui te, India ramin hma kan sâwn chhoh dânte a tlangpuia târlan a ni. Zirlai, nu leh pa leh upa lam tân pawha hriatthiam awl leh ngaihnaawm, space age-a awmte tâna thu bengvarthlâk leh hriat ngei tûr ziahna bu a ni.



Author with

*Dr. K. Radhakhishnan, Secretary, DOS and
Chairman, Space Commission, Gov't. of India*

Dr. R.K. Lalanthanga, M.Sc, Ph.D hian kum 1988 ah Scientific Officer hna zawmin. Satellite Remote Sensing hmanga thil zirnaah mizote zingah sôlsutu pawimawh tak a ni a. ISRO, Department of Space, Gov't of India hnuaia Centre hrang hrangte nën Mizoram tâna tangkal tûr thil chi hrang hrang an zirho thin. Scientific report hrang hrang ziaik tawhin, research article eng emaw zat a ziaik tawh bawh. Tunah hian Directorate of Science & Technology-ah Principal Scientific Officer niin. MIRSAC-ah Project Director a ni bawh.